



DRUG THERAPY FOR SWINE FLU- AN OVERVIEW

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ABSTRACT

Swine flu also known as H1N1 has become the worlds fastest moving influenza pandemic, sweeping across 177 countries in the four months since it was first identified, according to the US centres for Disease control and prevention based in Atlanta. More than 1 million people have already contracted the virus in New York alone, according to estimates by the cities health department. It is a form of influenza that originated in pigs but can be caught by, and spread among people. This is a dangerous scenario in 21st century. So, there is a need to prevent and to treat the swine flu all over the world. Clinical trails are going on for treating this swine flu but still there is no proper drug therapy for this disease. Here we reveal that complete drug therapy for this disease for swine flu in several medicinal systems and prevention techniques like vaccine therapy.

KEY WORDS

Swine flu, Vaccine, Prevention, Anti virals.

INTRODUCTION

Swine flu is a respiratory disease in pigs caused by influenza. Pigs can pass the illness onto humans after contact with them. The latest disease is a

new mix of pig viruses with some human and bird viruses¹. Swine flu has been confirmed in a number of countries and it is spreading from human to human, which could lead to what is referred to as a pandemic flu outbreak². Pandemic flu is different from ordinary



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flu because it's a new flu virus that appears in humans and spreads very quickly from person to person worldwide.

SIGNS AND SYMPTOMS

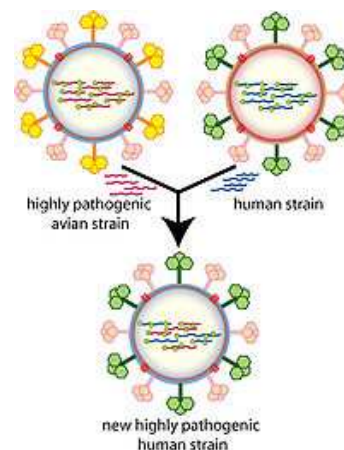
Direct transmission of a swine flu virus from pigs to humans is occasionally possible (zoonotic swine flu)³. In humans the symptoms of the 2009 "swine flu" H1N1 virus are similar to those of influenza and of influenza-like illness in general. Clinical symptoms⁴ are similar to seasonal influenza but reported clinical presentation ranges broadly from asymptomatic infection to severe pneumonia⁵ resulting in death. Patients experience high fever, lethargy, lack of appetite, and coughing. Those afflicted may also get a runny nose sore throat, nausea, vomiting, diarrhoea.

TRANSMISSION TO HUMANS:

People, who work with poultry and swine, especially people 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 reassortment⁶ 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. Other professions at particular risk of infection are veterinarians and meat processing workers, although the risk of infection for both of these groups is lower than that of farm workers

SPREADING :

- (i) Epidemic and pandemic spread:

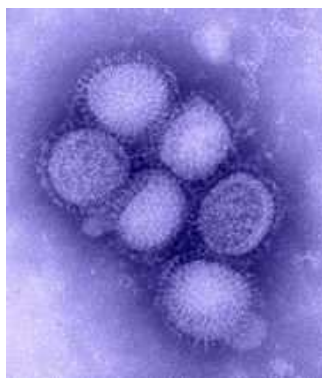


It spreads through direct contact (being within one metre of an infected person) or indirect contact (touching a contaminated surface). Flu viruses can survive for hours on different surfaces, such as doorknobs and handles, so it may be spread through contact with different surfaces. The World Health Organization says: "there is no risk of infection from this virus from consumption of well cooked pork and pork products⁷."

SWINE FLU VIRUS TYPES:

Avian influenza and human influenza viruses as well as swine influenza viruses can infect pigs. When influenza viruses from different species infect pigs, the viruses can reassort (i.e. swap genes) and new viruses that are a mix of swine, human and/or avian influenza viruses can emerge. There are four main influenza types A virus subtypes that have been isolated in pigs: H1N1, H1N2, H3N2, and H3N1.

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Electron microscope image of the reassorted H1N1 influenza virus. The viruses are 80–120 nanometers in diameter.

PREVENTION

(i) Prevention of pig to human transmission :

The transmission from swine to human is believed to occur mainly in swine farms where farmers are in close contact with live pigs. So farmers and veterinarians are encouraged to use a face mask 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 not wearing gloves when working with sick animals⁸.

(ii) Prevention of human-to-human transmission:

Recommendations to prevent spread of the virus among humans include using standard infection control against influenza. This includes frequent washing of hands with soap and water or with alcohol-based hand sanitizers, especially after being out in public. Disinfecting household surfaces, which can be done effectively with diluted chlorine bleach solution, also reduces chance of transmission.

Alcohol-based gel or foam hand sanitizers work well to destroy viruses and bacteria. Anyone with flu-like

symptoms such as a sudden fever, cough or muscle aches should stay away from work or public transportation and should contact a doctor for advice. Social distancing is another tactic. It means staying away from other people who might be infected and can include avoiding large gatherings, spreading out a little at work, or perhaps staying home and lying low if an infection is spreading in a community.

The spread of the viruses that cause respiratory illnesses like influenza can be prevented by:

1. Covering your nose and mouth with a tissue when you cough or sneeze. Throw the tissue in the trash after you use it. Swine flu is communicable disease, so use the face masks to protect from the swine flu antigens.
2. Washing your hands often with soap and water, especially after you cough or sneeze. You can also use alcohol-based hand cleaners.
3. Avoiding touching your eyes, nose or mouth. Germs spread this way.
4. Trying to avoid close contact with sick people. Keep a distance of minimum 6 feet from people affected with Catarrh, Cough and Fever.
5. Staying home from work or school if you are sick.
6. Avoid contact with the pigs (swine). If you have pigs in your area then please inform the local municipal office so that they can take care of those pigs by keeping them isolated.
7. Avoid shaking hands, embracing and visiting the congested places and also crowded places like theatres, this can be a cause of spreading ground for Swine flu.
8. Avoid eating outside food because it may be contaminated and may make you infected with the virus.
9. Don't use the public urinals because many people spit there, which could lead to the spreading of the disease.



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10. Instruct the above points to children as they may be victimised easily with the Swine flu.
11. Use boiled water only to drink.

TREATMENT

ALLOPATHY MEDICINE:

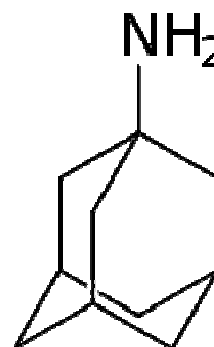
If a person becomes sick with swine flu, antiviral drugs⁹ can make the illness milder and make the patient feel better faster. They may also prevent serious flu complications. Beside antivirals, palliative care, at home or in hospital, focuses on controlling fevers and maintaining fluid balance.

Antiviral Drugs and H1N1 Flu (Swine Flu):

Antiviral drugs are prescription medicines (pills, liquid or an inhaler) with activity against influenza viruses, including swine influenza viruses. Antiviral drugs can be used to treat swine flu or to prevent infection with swine flu viruses. These medications must be prescribed by a health care professional. Influenza antiviral drugs only work against influenza viruses -- they will not help treat or prevent symptoms caused by infection from other viruses that can cause symptoms similar to the flu. There are four influenza antiviral drugs approved for use in the United States, Amantadine, Rimantadine, Zanamivir, Oseltamivir.

The swine influenza A (H1N1) viruses that have been detected in humans in the United States and Mexico are resistant to amantadine and rimantadine so these drugs will not work against these swine influenza viruses. Laboratory testing on these swine influenza A (H1N1) viruses so far indicate that they are susceptible (sensitive) to oseltamivir and zanamivir.

1. Amantadine :



IUPAC Name : adamantan-1-amine

Generic Name is Amantadine hydrochloride in capsule Dosage Form. Amantadine is the organic compound known formally as 1-aminoadamantane. The molecule consists of adamantane backbone that is substituted at one of the four methyne positions with an amino group. This compound is sold under the name "Symmetrel" for use both as an antiviral and an antiparkinsonian drug .

Mechanism of action : The mechanism of Amantadine's antiviral activity involves interference with a viral protein, M2 (an ion channel)¹¹, which is required for the viral particle to become "uncoated" once taken inside a cell by endocytosis. Amantadine inhibits the replication of influenza A viruses by interfering with the uncoating of the virus inside the cell. It is an M2 inhibitor which blocks the ion channel formed by the M2 protein that spans the viral membrane. The influenza virus enters its host cell by receptor-mediated endocytosis. Thereafter, acidification of the endocytotic vesicles is required for the dissociation of the M1 protein from the ribonucleoprotein complexes. Only then is the ribonucleoprotein particles imported into the nucleus via the nuclear pores. The hydrogen ions needed for acidification pass through the M2 channel. Amantadine blocks the channel. Amantadine is effective against all influenza A subtypes that have



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previously caused disease in humans (H1N1, H2N2 and H3N2), but not against influenza B virus, because the protein M2 is unique to influenza. Amantadine is not active against the avian influenza subtype H5N1 strains which have recently caused disease in humans. Uses : It was approved by the U.S. Food and Drug Administration in October 1966 as a prophylactic agent against Asian influenza and eventually received approval for the treatment of Influenza virus A¹⁰ in adults.

Side effects: CNS side effects include nervousness, anxiety, agitation, insomnia, difficulty in concentrating, and exacerbations of pre-existing seizure disorders and psychiatric symptoms in patients with schizophrenia or Parkinson's disease. Another potential side effect is livedo reticularis, a dermatological reaction that results in skin mottling and purpurish mesh network of blood vessels.

Dosage: 200 mg qd both for treatment and prophylaxis. For prophylaxis, amantadine should be started as soon as possible after exposure and continued for at least 10 days.

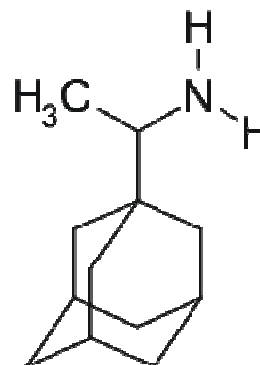
Special Dosage: persons with reduced kidney function and elderly persons may need lower doses (or less frequent doses).

Contraindications: psychosis. Patients with insufficiently treated epileptic episodes.

2. Rimantadine :

IUPAC Name: (RS)-1-(1-adamantyl)ethanamine

Rimantadine(Flumadine)is an orally administered antiviral drug¹² used to treat, and in rare cases prevent, Influenza virus A infection. When taken within one to two days of developing symptoms, rimantadine can shorten the duration and moderate the severity of influenza.



Adverse effects: Rimantadine can produce gastrointestinal and central nervous system adverse effects. Studies have shown it produces fewer side effects than other anti-viral influenza treatments.

Common side effects include: nausea, upset stomach, nervousness, tiredness, lightheadedness, trouble sleeping, difficulty concentrating.

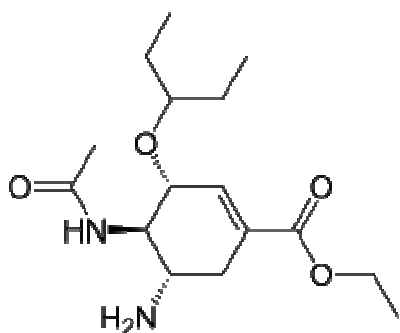
Mechanism of action: Rimantadine is an M2 ion channel inhibitor which specifically inhibits the replication of influenza A viruses by interfering with the uncoating process of the virus. M2 inhibitors block the ion channel formed by the M2 protein that spans the viral membrane. The influenza virus enters its host cell by receptor-mediated endocytosis. Thereafter, acidification of the endocytotic vesicles is required for the dissociation of the M1 protein from the ribonucleoprotein complexes. Only then is the ribonucleoprotein particles imported into the nucleus via the nuclear pores. The hydrogen ions needed for acidification pass through the M2 channel. Rimantadine blocks the channel.

Treatment : In early trials involving patients with uncomplicated influenza A H3N2 subtype virus infection, rimantadine treatment (200 mg/day for 5 days) was associated with significant reductions in nasal secretion viral titres, maximum temperature,

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time until defervescence (mean, 37 h shorter), and systemic symptoms compared with placebo. Rimantadine seems to be relatively safe even among vaccinated elderly individuals living in nursing homes. In this population, a dosage reduction to 100 mg/day is recommended. In experimentally infected adults, rimantadine had no effect on nasal patency, mucociliary clearance, nasal signs, or on symptoms and signs of otologic complications.

3. Oseltamivir :



IUPAC Name : ethyl (3R,4R,5S)-5-amino-4-acetamido-3-(pentan-3-yloxy)cyclohex-1-ene-1-carboxylate

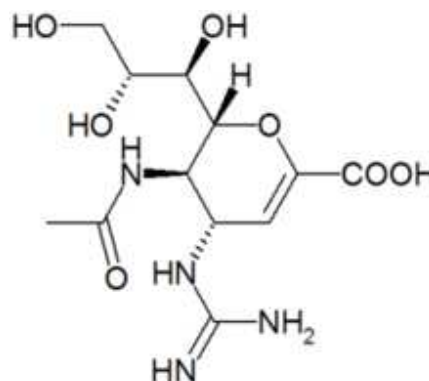
Oseltamivir (Tamiflu) is an antiviral drug that slows the spread of non-resistant strains of the influenza virus between cells in the body. It is used in the treatment and prophylaxis of Influenzavirus A and Influenzavirus B infection. oseltamivir is a neuraminidase inhibitor. It acts as a transition-state analogue inhibitor of influenza neuraminidase, preventing progeny virions from detaching from infected cells¹³. Oseltamivir was the first orally active neuraminidase inhibitor commercially developed. It is a prodrug, which is hydrolysed hepatically to the active metabolite, the free carboxylate of oseltamivir

Clinical usage: Oseltamivir is indicated for the treatment and prevention of infections due to influenza A and B virus in people at least one year of

age. The importance of early treatment is that the NA protein inhibition is more effective within the first 48 hours. If the virus has replicated and infected many cells the effectiveness of this medication will be severely diminished, especially over time¹³.

The standard recommended dose incompletely suppresses viral replication in at least some patients with H5N1 avian influenza, increasing the risk of viral resistance and rendering therapy less effective. Accordingly, it has been suggested that higher doses and longer durations of therapy should be used for treatment of patients with the H5N1 virus.

4. Zanamivir :(Relenza)



IUPAC Name : (2R,3R,4S)-4-[(diaminomethylidene)amino]-3-acetamido-2-[(1R,2R)-1,2,3-trihydroxypropyl]-3,4-dihydro-2H-pyran-6-carboxylic acid.

Warning: zanamivir is not recommended for the treatment of patients with underlying airways.

Mechanism of action: Zanamivir is a neuraminidase inhibitor used in the treatment and prophylaxis of Influenzavirus A and Influenzavirus B. Zanamivir works by binding to the active site of the neuraminidase protein, rendering the influenza virus unable to escape its host cell and infect others. It is also an inhibitor of influenza virus replication in vitro and in vivo. In clinical trials it was found that



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zanamivir was able to reduce the time to symptom resolution by 1.5 days if therapy was started within 48 hours of the onset of symptoms.

Adverse effects: Zanamivir has a good safety profile and the overall risk for any respiratory event is low. The following adverse reactions have been identified during post-marketing use of zanamivir, but it is not possible to reliably estimate their frequency or establish a cause relationship to zanamivir exposure: Allergic or allergic-like reaction, including oropharyngeal oedema, Arrhythmias, syncope, Seizures, Bronchospasm¹⁴, dyspnoea

VACCINE

A vaccine, which produces a robust immune response at one go, might make swine flu easier to handle. Even though, immunization needs intensive testing as it may compound any side effects the vaccine might have. Vaccination against swine flu is recommended for most members of high-risk groups who would be likely to suffer complications from H1N1 flu^{15,16}.

AYURVEDIC MEDICINE¹⁷

The swine flu virus, just like other viruses, can attack the body when the body's immune system is weak. This is why it is essential to build the body's defense mechanism. Ayurvedic treatment focuses on boosting the body's immunity level. This article dwells on the relation between swine flu and Ayurveda. "The disease (swine flu) and its treatment is already mentioned in our old books of medicines by sages. On the basis of the symptoms of swine flu, it has been given the name 'vatashlesmic' fever in the ayurvedic medicine books." Ayurveda, the traditional 'science of life', has a remedy for diseases when every other stream of medicine fails. Ayurveda

promotes the concept that if one's immune system is strong, then even if the body is exposed to viruses, one will not be affected. During a pandemic or an epidemic, Ayurveda emphasizes on the immunity of people living in regions affected by viruses. This branch of medicine promotes the intake of special herbs or decoctions to increase the immunity level of the people. Ayurvedic remedies comprise pure natural herbs, which are effective in preventing swine flu. Moreover, the herbs are used to relieve swine flu symptoms, and boost the immune system against the H1N1 virus.

In Ayurveda, health ailments like swine flu are because of weakened immunity that the body cannot withstand against the attack of disease causing germs. Ayurveda, as always, believes in strengthening the body systems that fight and win the battle against H1N1 Virus. This is done by prescribing various digestive fire strengthening herbs such as Guduchi (licorice), Tulasi (Holy Basil), Sahadevi, Neem (Indian Margosa Tree), Shunthi (ginger), Pippali (pepper) etc. Once the digestive fire is corrected, medicines such as Triphala, Rasna, Eranda, Guggulu can be prescribed to relieve the symptoms.

Ayurvedic treatment for swine flu involves: (a) Basil, (b) Ginger and Garlic, (c) Gooseberry and AloeVera, (d) Camphor and Eucalyptus Oil:

HOMEOPATHY MEDICINE¹⁸

Homeopathy also claims to have medication for H1N1 treatment. No matter that homeopathic treatment involves a slow process of curing any disease, its practitioners still consider it to be effective in treating swine flu. "Swine flu is influenza like illness, where primary symptoms are very much similar to those of influenza. Thus one can take Influnzenium 200 as a preventive medicine. Three doses each after 10 minutes within 24 hours can



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develop immunity against H1N1 virus.” Considering that the Swine Flu virus produces symptoms similar to the human influenza virus, the following homeopathy medicines may prove useful in cases of swine influenza: Gelsemium[Gels], Baptisia, Sabadilla [Sabad], Arsenicum[Ars], Dulcamara[Dulc], Bryonia, Rhus toxic odendron[Rhus-t]: Alliumcepa[All-c], Sticta [Stict], Ipecac, Veratrum album

*SIDDHA MEDICINE*¹⁹

The traditional Siddha system has very effective medicines for the prevention and treatment of swine flu. The Siddha system was the most effective way to check the epidemic without any side effects on the users. The ways to prepare the medicine from the commonly available plants, a decoction made of Tulsi (10 leaves), Karpooravalli (5 leaves), Black Pepper (5), Cloves (5), Cardamom (5) and Honey (two tea spoons) would be effective for preventing the swine flu. The ingredients should be boiled in one litre of water and then filtered. An adult should take 150 ml of the filtered potion once in a day while a child could be given 75 ml. It could be taken for about seven to 10 days. The Siddha preparation of another portion for treating an infected person. Crush hundred grams each of Nilavembu, Seenthil, Adathoda, Vishnu Karanthai, Parpadagam to make into a powder. Take 50 grams of the powder and heat it adding one litre of water. The infected adult should take 150 ml while a child could be given 75 ml for seven to ten days.

CONCLUSION

In this overview we have discussed several precautions and treatment in several medicinal systems like allopathy, ayurvedic, homeopathy, siddha and also explained the report of clinical trials in vaccine. We concluded that swine flu is a

dangerous scenario now. The scientists are carrying out number of clinical trials for preventing and treating this disease. Even though still we could not able to get an exact treatment due to the nature of virus, which has been modifying genetically. So there is a need to take a precaution and to spread the awareness regarding swine flu to people. Final conclusion regarding swine flu is that “prevention is better than cure”.

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