

SWINE FLU(H1N1 VIRUS): A PANDEMIC GLOBAL HAZARD

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ABSTRACT

The outbreak of swine flu has become an alarming red alert and a ticking pandemic time bomb around the world and mostly in India. The dreadful influenza virus (H1N1) has affected all the continents in the world. According to the recent swine flu updates around 33,000 people were infected with this deadly virus in India and around 2000 people were reported death cases in different parts of India. As it is a new virus and people have not developed immunity towards it. Mostly children and pregnant women are affected and people suffering from respiratory tract diseases like asthma, pneumonia, bronchitis are mostly prone to this mercy less virus. The health care sector should work in an efficient way to get rid of this pandemic virus by encouraging the pharmaceutical companies to develop novel antiviral lead molecules which work efficiently than the prevailing drugs, the present antiviral drug used for treatment are oseltamivir and zanamivir as an alternative drug. Proper sanitation facilities, vaccination, different diagnostic procedures to quarantine the infected people, preventing the mass gatherings, providing masks to cover mouth and nose has to be taken care off to protect from spread of the virus. The government also has to take necessary proactive measures to prevent the spread of this dreadful virus by public awareness with the help of electronic and print media. Hence, clinical management of this virus has to be taken prior importance.

Keywords: Swine flu, Pandemic, Oseltamivir, Zanamivir.

INTRODUCTION

"Swine flu" mostly related to influenza in pigs. Other common names for Swine flu are called pig influenza, swine influenza, hog flu and pig flu. Pigs transmit influenza viruses to humans, predominantly to people who are intact with the farming of hogs and veterinarians¹. This infection is a kind of variant of H1N1 influenza (Figure 1) infection. This influenza virus transmits from human-human by air borne infection from infected person to person by sneezing or coughing.

People mostly with respiratory disorders like asthma, bronchitis, pneumonia are affected by this influenza virus. There are thousands of cases reported of swine flu in the present day². The

human respiratory infection caused by a particular influenza virus H1N1 strain was first reported in march/April California and Texas and also in Mexico and it is popularly known as swine flu. A few months after the first swine flu cases were reported, rates of confirmed H1N1-related illness were increasing in much of the world. India became the biggest victim for this dreadful virus. The virus has killed 981 people in 2009 and 1763 in 2010 it was then declared as pandemic in India³. The death rate has decreased in 2011 to 75 but it has increased to 405 in 2012 and 699 in 2013. In the year 2014 India has reported 937 cases and around 218 deaths has occurred^w. Swineflu has different subtypes like H1N1, H1N2, H3N1, H3N2, and H2N3 which are new virus and drugs for this

influenza are still under clinical trials. Latest in 2015 there is major breakout of swine flu cases in major parts of India. Mostly effected states in India are Gujarat and Rajasthan with 6459 and 6559 reported cases^{4,5,6}. Eventually the number has increased by March 2015. According to the health ministry survey there are confirmed cases of 33,761 and death reported are 2035 as on 30th March 2015⁷. Every year in winter/spring the mortality rate gets increased due to the favorable conditions for the existence of the virus. As a result, the World Health Organization declared the infection a global pandemic in August 2010. In 2015, the outbreak became widespread through India. On 12 February 2015, Rajasthan declared an Epidemic state⁸ which is prone to swine flu at a larger proportion.

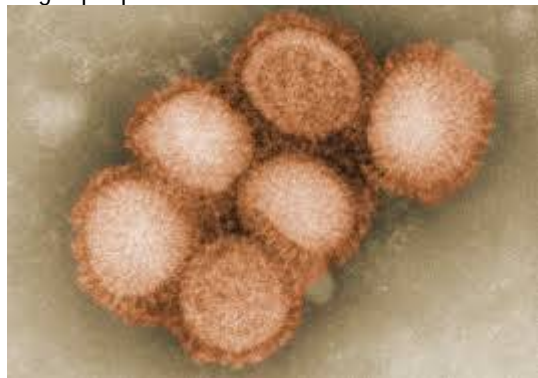


Fig. 1: Electron microscope image of H1N1 virus

HISTORY

The Flu virus was first identified in 1890 which was named as H2N8. Later in 1900 H3N8 was identified⁹. The first identification of an influenza virus was seen in 1930 which caused infection in pigs¹⁰. During late 90's and early phase of 20th century there evolved some different new virulent strain mostly around three sub types and five different genotypes in north America, the strains are H3N2. These strains make their origin from derived by recombination from human, hog and avian viruses; have become a major cause of swine influenza in North America. The combination of H1N1 and H3N2 produced H1N2. In 1999 in Canada¹¹, a strain of H4N6 crossed the species barrier from birds to pigs. Around 1918, the ancestral virus of avian origin, crossed the species

boundaries and infected humans as human H1N1. Lastly in 2009 H1N1 virus was declared pandemic virus which is named as swine flu virus which agitated the earth with its prevalence¹². The history of origin of flu virus is stated in Table 1.

Table 1: Historical origin of flu

S NO	YEAR	SUB-TYPE
1	1890	H2N8
2	1900	H3N8
3	1918	H1N1 (Spanish flu)
4	1957	H2N2 (Asian flu)
5	1968	H3N2 (Hongkong flu)
6	1977	H1N1 (Russian flu)
7	2009	H1N1 (Swine flu)

FACTS

The virus is transmitted to people from animals and wide spread in the human race through direct transmission. The average fatality rate is around 30%. Case fatality rates have varied from 25% to 90% in the former outbreaks¹³. Community awareness about the disastrous infection is key to success to control the pandemic eruption. Good control relies on applying a package of interventions namely case management, surveillance and contact tracing, a proximate laboratory service, safe entombing and social mobilization¹⁴. The pharmaceutical industries should be given maximum feasibility to develop new lead molecules for the treatment of H1N1 virus.

GEOGRAPHICAL DISTRIBUTION¹⁵

Swine flu has conquered most of the continents and affected many of the people all over the world. It is well illustrated in figure 2.

OUTBREAK OF SWINE FLU IN INDIA

Swine flu has conquered India and became a major hazard in many of the states in India. Now it became a major concern and important aspect so as to eradicate and control the damage incurred by the attack of this influenza virus. The statistics of the damage occurred in different states in India are illustrated in figure 3.

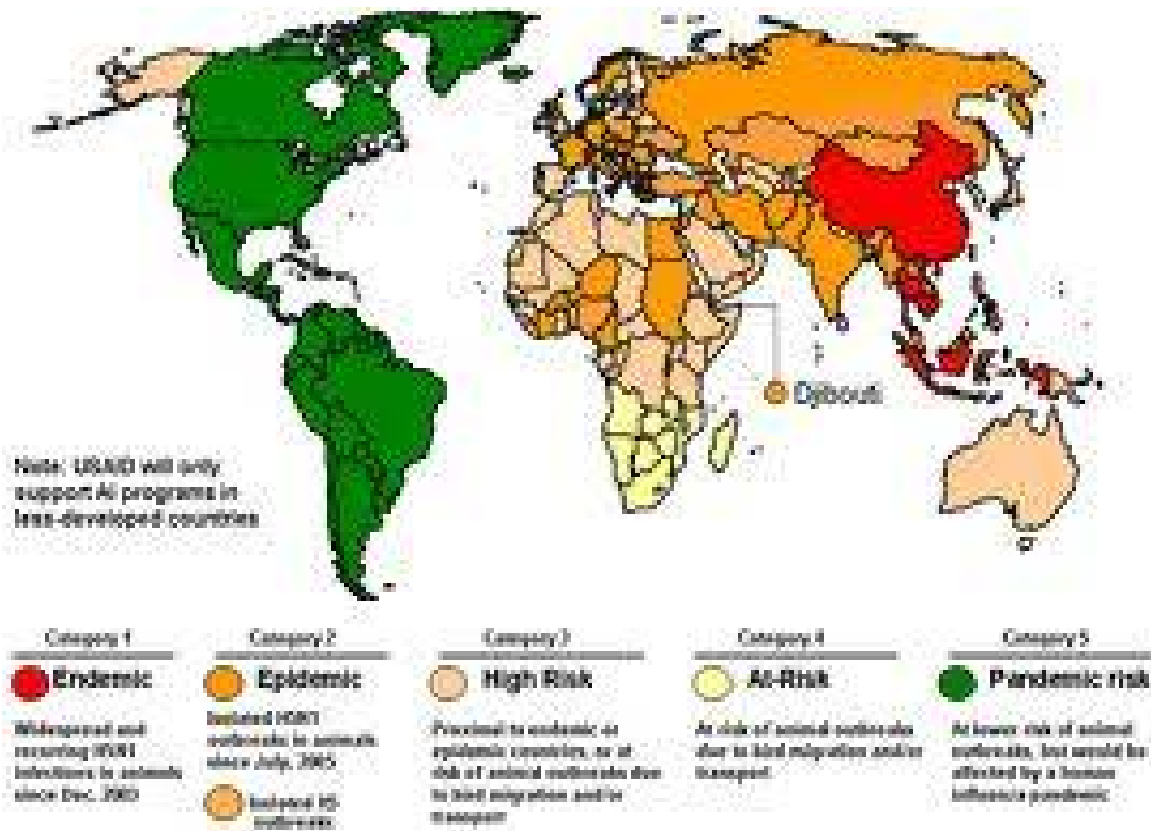


Fig. 2: Geographical distribution of flu around the world

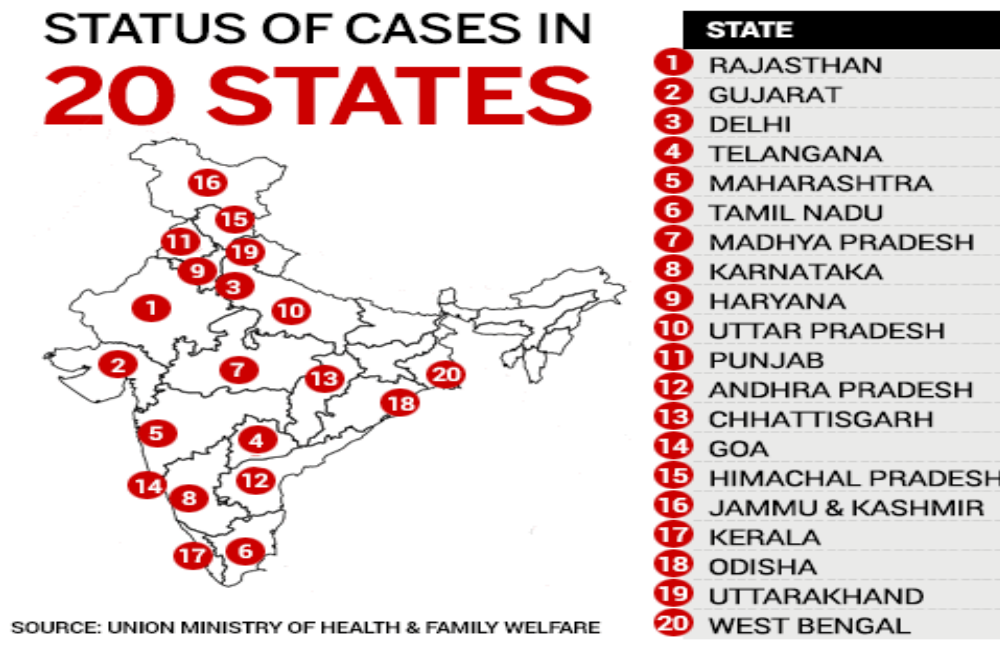


Fig. 3: Status of Swine flu cases in India

Table 2: States which reported most number of swine flu cases and total no of swine flu victims in India till 30th March 2015

State	Cases Reported	Deaths Reported
Rajasthan	6,559	415
Gujarat	6,495	428
Delhi	4,137	12
Maharashtra	4000	394
Madhya Pradesh	2,185	299
Telangana	2,140	75
Karnataka	2,733	82
Total number of Swine flu victims in India	33,761	2,035

Delhi and Tamil Nadu reported a large number of cases, but the death toll was lower due to better awareness and a better developed health care sector¹⁶. The Indian health ministry has procured ample amount of anti viral drugs such as Oseltamivir (Tamiflu) and also N-95 masks as a part of protective measure¹⁷. The President of the North West Chemist Association, Hakim Kapasi said in February 2015 that, private pharmacies were facing a shortage because Oseltamivir was a controlled Schedule X drug and very few pharmacies had the license to sell it¹⁸. Government of Delhi fixed the price of swine flu diagnostics tests and it also issued a notice that labs should not charge more. On 24 February, the District Collector of Ahmadabad, Gujarat, prohibited unlawful assembly under Section 144 of the CrPC to prevent spread of the disease. A paper published in Cell Host and Microbe¹⁹, stated that the virus had acquired a mutation which made it easier to infect humans, and called for real time surveillance with genetic and phenotypic analysis made available quickly, noting "Given the global reach of influenza, there is an urgent need to develop a comprehensive and at least somewhat standardized response to influenza epidemic outbreaks." This is contrary to the Indian government's claim that no mutations had been found. On 2 March 2015, Maharashtra government announced that the cost of treatment of swine-flu patients in the state will be paid by the state government. H1N1 kills 11 in Hyderabad in 30 days, Telangana chief minister K. Chandra shekar Rao puts medics on alert. He also requested the prime minister of India Mr. N. Narendramodi to immediately send the medical support to tackle the swine flu cases in Telangana²⁰.

ANATOMY OF INFLUENZA VIRION²¹

Influenza [virion](#) is spherical. 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.

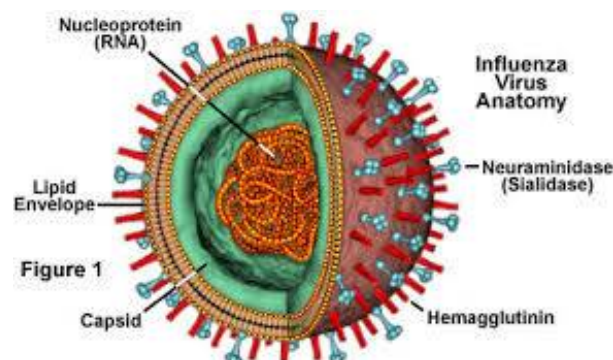


Fig. 5: Structure of influenza virion

PREVALENCE AND DISSEMINATION OF VIRUS²²

Swine flu is mostly air borne disease, like other viruses through different channels it enters into our body (like nose, mouth, mucous membranes), swine flu is mostly affected in spring/winter season. The infected person category are mainly infants and pregnant women and people suffering from asthma the droplets which carry the influenza virus spreads through direct contact from human to human or indirect contact. Mostly this infection spread before the appearance of the symptoms and after one week of illness. Swine flu effected personals should be properly quarantined

and they have to be attended for medical supervision mostly the young adults and children the swine flu virus persists for a long period of time. It was wrongly believed that eating pork will infect personnel with swine flu but properly cooked pork at 72°C for one hour will probably kill the virus and they are safe and can consume the meat.

INCUBATION AND LIFE CYCLE OF SWINE FLU²³

After entering into the body the influenza virus incubates for two days. In most of the cases the influenza virus was believed to incubate from two days to one week. As such, there is quite a dispute all over the world about the incubation period. Hence, as a suggestion it would be wise to keep an eye out for approximately 10 days to be sure of the infection. Most US cases have shown the incubation period to be between two to seven days.

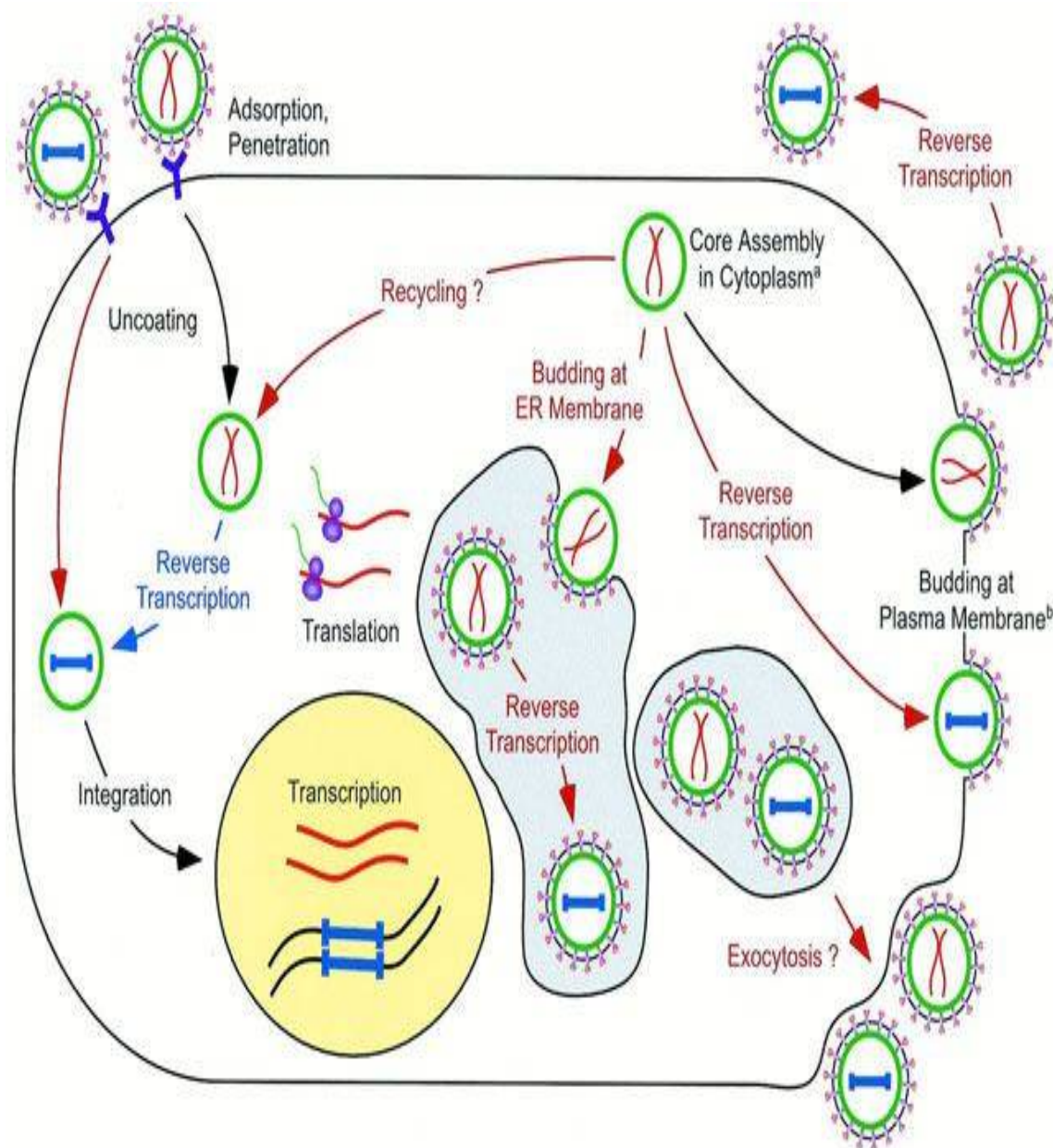


Fig. 6: Life cycle of the virion in the host cell

SIGNS AND SYMPTOMS



Fig. 7: Signs and symptoms of the infected people

The symptoms of the person with swine flu will be the same as that of people affected from normal flu²⁴.

The difference between the H1N1 virus infected personnel and other normal flu infected people are²⁵⁻²⁸

- Persistent coughing with sore throat
- Vomiting
- Redness of eyes
- Increase in the body temperature
- Headaches,
- Muscle ache
- Dizziness
- In children this may affect the diet by making reluctance towards the food
- It also causes for discoloration of lips and skin

PRECAUTIONARY MEASURES TO BE TAKEN OF 2009 H1N1 INFECTED VIRUS²⁹

Homeopathy Arsenic 30 preventive for H1N1 flu, says CCRH. The Indian Department of AYUSH (alternative systems) has released a press note suggesting use of Arsenic alba 30 one dose for three consecutive days as preventive for Swine flu. It has the approval of Director General Health Services and Ministry of Health & Family Welfare. This has come after a study by Experts of "Genus Epidemicus" (Common symptoms of suffering patients from repressed drug). In this study Arsenic alba covered 80% of the symptoms.

Regarding exploring the scope of homeopathy, homeopathic medicines in H1N1 virus (swine flu) prevention and treatment, Dr. Anil Singhal, MD (Homeo), a homeopathic physician and consultant in Gurgaon, near New Delhi proposed guidelines related to:

Prevention."In the second week of August, I suggested Arsenic alba homeopathic remedy as a prophylactic homeopathic medicine for H1N1 flu. With some of my views on H1N1, I believe, we all can work together to make this world H1N1 free" says Dr. Anil Singhal, MD(Hom.), Visiting Faculty to Nehru Homoeopathic Medical College & Hospital, New Delhi, Dr. B. R. Sur Homoeopathic Medical College & Hospital, New Delhi, and Bakson Homoeopathic Medical College & Hospital, Greater Noida.



Fig. 8: Homeopathic medicines Arsenic alba available in the market

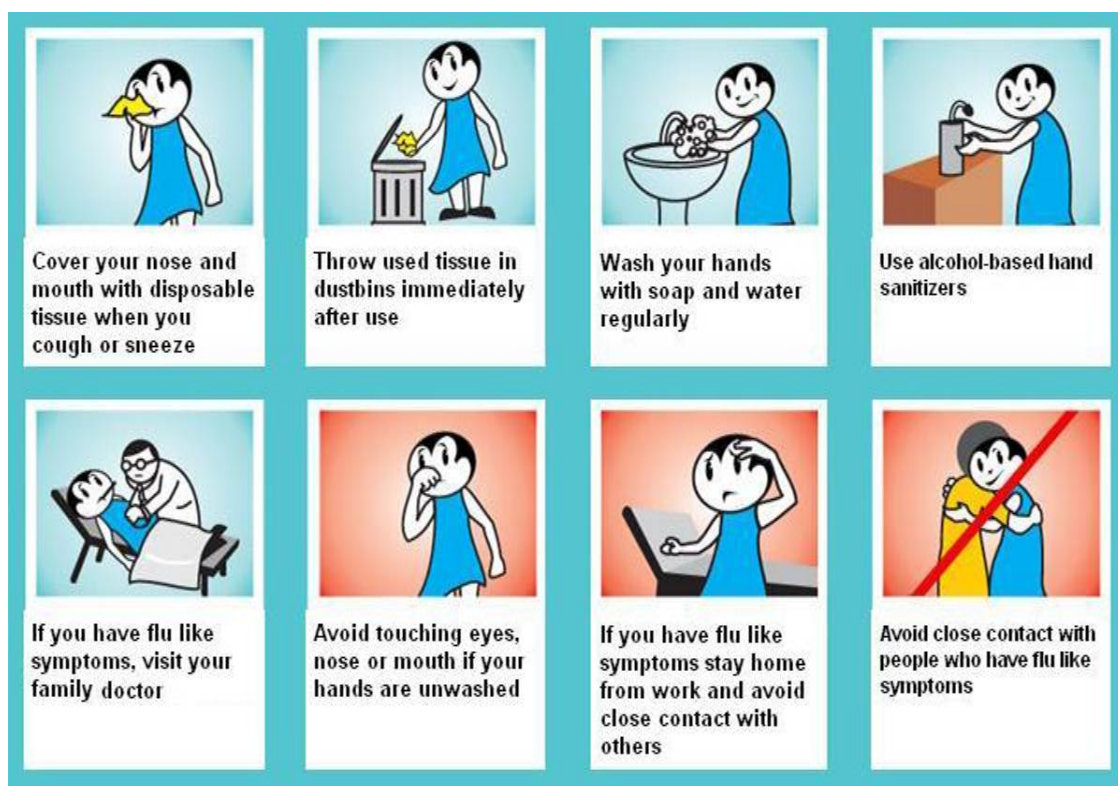


Fig.9: Precautionary measures to be taken by the public

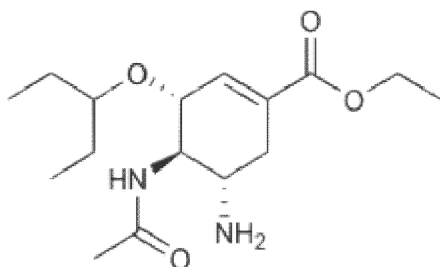


Fig. 10: Best preventive measures to eradicate spread of infection

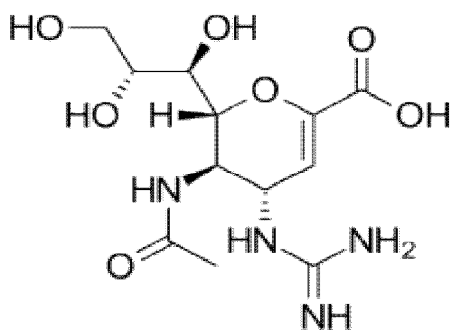
TREATMENT³⁰

Allopathic Drug Remedies

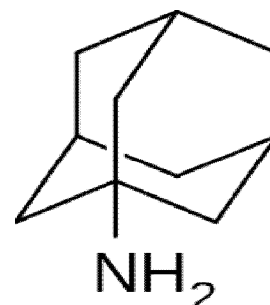
Antiviral drugs are prescription medicines (pills, liquid or an inhaler) with activity against influenza viruses, including swine influenza viruses. Antiviral drugs can be used to treat swine flu or to prevent infection with swine flu viruses. These medications must be prescribed by a health care professional. 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.

Oseltamivir

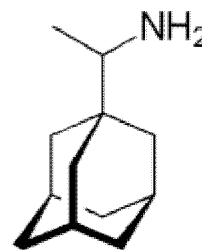
Oseltamivir is developed by US based Gilead Sciences which licensed exclusive rights to Roche in 1996. It is a potential drug moiety for the treatment of Influenza A and Influenza B. It is generally marketed in the trade name of Tamiflu. It is administered orally. It is a neuraminidase inhibitor the main side effects of this drug is vomiting, headache.

Zanamivir.

Zanamivir is developed by Australian biotech firm Biota holding. It is a potential drug moiety for the treatment of Influenza A and Influenza B. It is generally marketed in the trade name of Relenza. It is currently marketed by GlaxoSmithkline. It is administered as oral inhalation. It is a neuraminidase inhibitor. The main side effects of this drug is broncho spasm, headache.

Amantadine

It is developed by Endo Pharmaceuticals is a drug that has USFDA approval for the use as an Antiviral drug. This also show CNS side effects, nervousness, anxiety, agitation, insomnia. According to US CDC seasonal H3N2 2009 pandemic flu samples are tested resistance to adamantanes and it is now not recommended for the treatment of influenza virus.

Rimantidine

It is used in the treatment of influenza A in rare cases, it will shorten the duration and moderate sensitivity of influenza. It is marketed in the trade name of Flumadine. It is an USFDA approved drug in 1994. But it is no longer used in the treatment of influenza. According to US CDC seasonal H3N2 2009 pandemic flu samples are tested resistance to adamantines and it is now not recommended for the treatment of influenza virus.

NATURAL REMEDIES³¹

The swine flu virus is more susceptible to the people who have weak immunity. The natural system of medicine is mainly based upon the upgrading the body defense mechanism and decreased side effects, This is done by prescribing various digestive fire strengthening herbs such as



Fig. 11: Natural remedies for the treatment of swine flu

Digestive Aids



Fig. 12: Natural drugs used to increase the digestion power

More habitually available natural remedies for treatment of swine flu involves

- Basil,
- Ginger & Garlic,
- Gooseberry and Aloe Vera,
- Camphor and Eucalyptus Oil

VACCINATION³²

Vaccines which are used in the treatment of H1N1 swine flu influenza virus are

Pandemrix

Pandemrix is an influenza vaccine, H1N12009 flu pandemic colloquially called the swine flu. The

vaccine was developed by GlaxoSmithKline and patented in September 2006. The vaccine is one of the H1N1 vaccines approved for use by the European Commission in September 2009 upon the recommendations of the European Medicines Agency (EMA). The vaccine is only approved for use when an H1N1 influenza pandemic has been officially declared by the World Health Organization (WHO) or European Union (EU). This vaccine was initially developed as a pandemic mock-up vaccine using an H5N1 strain.

Celvapan

The 2009 flu pandemic vaccines are the set of influenza vaccines that have been developed to protect against the pandemic H1N1/09 virus. These vaccines either contain inactivated (killed) influenza virus, or weakened live virus that cannot cause influenza. The killed vaccine is injected, while the live vaccine is given as a nasal spray. Both these types of vaccine are usually produced by growing the virus in chicken eggs. Around three billion doses will be produced annually with delivery from November 2009. Pandemrix vaccine will only need one dose. People who have the Celvapan vaccine will need two doses three weeks apart. The swine flu vaccine is different from the seasonal flu vaccination that's offered every year.

The vaccine is being offered first to pregnant women at any stage of pregnancy, child and people who are most likely to become seriously ill if they catch swine flu. The vaccines contraindicated in those who had a severe allergic reaction to a previous dose of the vaccine or any component of the Vaccine.

MASK PROTECTION³³

People should avoid mass gathering and also should protect themselves from dreadful influenza virus by covering Mouth, Ear and Nose with the help of N-95 masks. Mostly people with less immunity are more prone to this influenza. Mostly children, pregnant women should take care as they are more susceptible (Fig. 13).

CONCLUSION

Swine flu is a mercy less virus, fatal within a short span of time. Proper medical supervision has to be provided to those who are infected with this virus. If the person is infected with normal flu and if it continues for more than 3 days, he has to be

scrutinized properly or else he has to take the medication prescribed for swine flu with no second thought.

In this review we have discussed about the status of different countries becoming the victim of swine flu in the recent years and especially India was prone to swine flu very badly in the recent times. So the government has to take necessary action to overcome this dreadful disease. We have also discussed about the signs and symptoms, general ayurvedic and allopathic remedies and also vaccines available for the treatment of this mercy less virus. The people also have to keep in mind that "Prevention is better than Cure" and maintain proper sanitation and personal hygiene and also avoid group gathering and should also have proper information about swine flu virus to lead a healthy and prosperous life ahead and eradicate these dreadful viruses from the face of the earth.



Fig. 13: Usage of mask as a preventive measure

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