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SWINE FLU EARLIER AND EXISTING: A BRIEF REVIEW

N. R. Livingston Raja[1, 2*], N. Balakrishnan[1], S. Antony Selvi[2], S. Gopikrishnan[1, 2], I. Gayathri fathima[2], L. Benita Mary[2] and M. Nesma[1]

[1]S A Raja Pharmacy College Vadakkangulam - 627 116, Tamilnadu, [2]Central Research Laboratory, Rajas Medical Institutions Kavalkinaru 627 105, Tamilnadu.

* Corresponding Author: liviverna2016@gmaiil.com

Abstract:

Swine Flu is one of the life-threatening spreadable disease present all over the world but recently in India many of the peoples are affected and some of them died.it is also known as Pig Flu or Hog Flu. It is an infection caused by any one of several types of swine influenza viruses. Swine influenza virus (SIV) or Swine origin influenza virus is any strain of the influenza family of viruses that is endemic in pigs. Swine Flu spreads from person to person either by inhaling the virus or by touching surfaces contaminated with the virus then touching the mouth or nose. Infected droplets are expelled in to the air through coughing or sneezing. In the United States, the number of clinical illnesses was reported. India had over 1,000 confirmed cases of swine flu so far that's roughly one case per every million people in the nation. H1N1 strains are still prevalent in India whose health ministry has reported over 2500 deaths to date. The first case of death had its epicenter in Pune. Schools and Colleges were closed and all were running to the adjacent clinics to buy mask materials, where the price of mask had an exceed all over the nation and the normal price of Rs.5 or 10 it raised to Rs.100 to 150. Pig Flu is diagnosed by rapid influenza diagnostic test that can help identify swine flu. Though, these are differ in efficiency and may show a negative result even though influenza is present. In addition to this test, routine blood tests, chest X-ray, nose or throat swab will be used for diagnosis of influenza. Complications like worsening of chronic conditions such as heart disease, diabetes, asthma and pneumonia. Symptoms of H1N1 flu are similar to those of the common flu and scientists are keenly studying the condition to better recognize its range of indications and how it is spread.

Key words: *Swine Flu, H1N1 influenza virus, prevalent, chronic, pneumonia, Hog Flu.*

Corresponding author:

N. R. Livingston Raja,

S A Raja Pharmacy College Vadakkangulam - 627 105, Tamilnadu.

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INTRODUCTION:

Swine flu (H1N1) "Swine flu" was the widespread name for flu caused by a reasonably new type of flu virus responsible for a global flu outbreak (or pandemic) in 2009-10. It's now just a normal type of seasonal flu and is included in the annual flu vaccine (htt/www.nhs.uk/conditions/swine flu). Swine Flu is an acute respiratory disease, also named as Pig Flu or Hog flu, Swine influenza, and Pig influenza. The typical swine flu virus an influenza type A (H_1N_1) virus was first quarantined from a pig in 1930 in U.S who has been worked as a pork producer, veterinarians to cause infection from Pigs worldwide [1]. In pigs Swine flu viruses cause low death rates. When anybody infected it show the symptoms like decreased appetite, increased nasal secretions, cough, and restlessness. Generally, the morbidity rate is high, and the case fatality rate low. Swine influenza viruses are not usually transmitted efficiently in human populations. Most infections are limited to the person who had contact with pigs, although viruses have occasionally spread to family members or others in close contact. Swine Flu was first come to view in April in Mexico 2009. Several countries affected by influenza virus including India concurrent occurred with bird flu extensively. World Health Organization announced swine flu is a global pandemic from June 2009 to August 2010. Spanish flu, Asian flu and Hong Kong flu are three global cosmic viruses found in last century. Out of these three global pandemics Spanish flu is very severe and causing pneumonias particularly for pregnant women who have less immunity [2]. The influenza virus having different strain like A, B, C for different species of host- human, pig and bird. Influenza A has capability to change persistently their antigenicity by mutation. The influenza virus has subtypes, one of the severe strain infecting human is H_3N_2, co-circulates with A/H_1N_1 and A/H_9N_2 in pigs [3]. Swine flu is an inaccurate name because the gene of the virus is very similar to those found in pigs in North America. Further, the new virus gene segments found from the swine, avian, human flu virus genes.

HISTORY OF THE VIRUS:

In 1918 the first pandemic influenza is more commonly called as Spanish flu. In that year they died people estimated 25- 40 million by the great influenza. In the same year 1918 china and Russia also infected in epidemic region [4]. First large-scale outbreak in 1976 when about 500 soldiers in a military camp in Fort Dix, New Jersey, America. They had suffered from respiratory symptoms like seasonal flu. The infection spread fastly within few weeks resulted in one death [5]. Swine influenza was first proposed to be a disease related to the human flu during 1918 flu pandemic, when pigs became ill at their same time as humans. The first identification of an influenza virus as a cause of disease in pigs occurred about 10 years later in 1930. For the following 60 years, swine influenza strains were almost exclusively H1N1. Between 1997 and 2002, new strains of 3 different sub types and 5 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 assortment from human, swine and Avian viruses, have become a major cause of swine influenza in North America. Resortment between H1N1 and H3N2 reduced H1N2. In 1999 in Canada a strain of H4N6 crossed the species barrier from birds to pigs. Since 2005, in the U.S. direct transmission from pigs to human 12 cases recorded. In India influenza virus is confirmed case reported in 16th May 2009 in Hyderabad. India had 3rd rank severely affected by witnessed the appearance of a novel avian influenza A subtype H_5N_1 which cause 438 cases 262 deaths. WHO reported that 195 countries are affected worldwide more than 414000 cases and about 5000 deaths as on 19th October, 2009. In India Maharashtra is the worst affected followed by Karnataka. Swine influenza cases reported between 1950 and 2014 less than 3% were fatal. According the latest report the swine flu already claimed more than 90 lives in 2016 in Punjab, Gujarat and Rajasthan [6].

PRESENT SCENARIO:

Meghalaya is on high alert following reports that 2 persons with H1N1 virus entered Assam recently on 28 of October 2018. Recently, 2 women were admitted to a city hospital after a tested positive for swine flu. All hospitals have been put on alert, said Hek the Health Minister. 4 new swine flu patients detected in Surat on 27 of October 2018. This has taken the total number of people afflicted with swine flu to 127 in this month soon season in the city. There are still 19 patients in different hospitals receiving treatment for swine flu. (Swine flu alert in Meghalaya TNN | Oct 28, 2018, 09:51 IST: The Times of India)

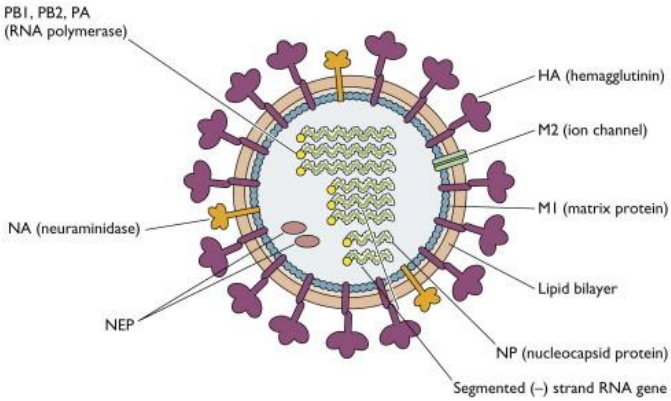

Fig: I: Reproduced from http://www.virology.ws/2009/04/30/Structure of influenza- virus

STRUCTURE:

The influenza virion (as the infectious particle is called) is roughly spherical. It is an enveloped virus – that is, 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 by us 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 adamantine – amantadine and rimantadine. Beneath the lipid membrane is a viral protein called M1, or matrix protein [7]. This protein, which forms a shell, gives strength and rigidity to the lipid envelope. Within the interior of the virion are the viral RNAs – 8 of them for influenza A viruses. These are the genetic material of the virus; they code for one or two proteins. Each RNA segment, as they are called, consists of RNA joined with several proteins shown in the diagram: B1, PB2, PA, and NP. These RNA segments are the genes of influenza virus. The interior of the virion also contains another protein called NEP [8].

LIFE CYCLE OF VIRUS [9]:

1. The swine flu virus uses its antigens to attach to the surface of cells in the nose, throat and lungs.
2. The cell engulfs the virus.
3. The virus is able to pierce the bubble of cell membrane that encloses it and release its RNA cargo into the cell.
4. In the nucleus, copies of the viral RNA are made.
5. Viral messenger RNA causes the cell to make viral proteins.
6. These proteins and RNA migrate to the cell's surface where they are assembled into new virus particles.
7. New virus start budding off from the cell surface.

SYMPTOMS OF SWINE FLU [10]:

Aches and Fevers:

Swine flu is severe body pains with sudden high fever and sudden severe cough, this can leads to muscle weakness and struggle to standing up or walking.

Generalized symptoms:

Chills, Malaise, Myalgia, Cough and sneezing, Headache, Weakness and fatigue, Aching muscles and joints, Sore throat, Runny nose, Diarrhea or stomach upset and Loss of appetite.

SERIOUS SWINE FLU SYMPTOMS [11]:

More serious symptoms that would indicate that a child with swine flu would need urgent medical attention include: Fast breathing or trouble breathing, Bluish or gray skin color, Not drinking enough fluids, Severe or persistent vomiting, Not waking up or not interacting, Being so irritable that the child does not want to be held, Flu-like symptoms improve but then return with fever and worse cough, Unusual tiredness, Headache, Runny nose, Sore throat, Shortness of breath or cough, Loss of appetite, Aching muscles.

HIGH RISK GROUP INCLUDES PERSONS HAVING [12]:

Chronic (long-term) lung disease, Chronic heart disease, Chronic kidney disease, Chronic liver disease, Chronic neurological disease (neurological disorders included chronic fatigue syndrome, multiple sclerosis and Parkinson's disease), Immunosuppression (whether caused by disease or treatment) Diabetes mellitus.

Also at risk are: Patients who have had drug treatment for asthma within the past three years, pregnant women, People aged 65 and older.

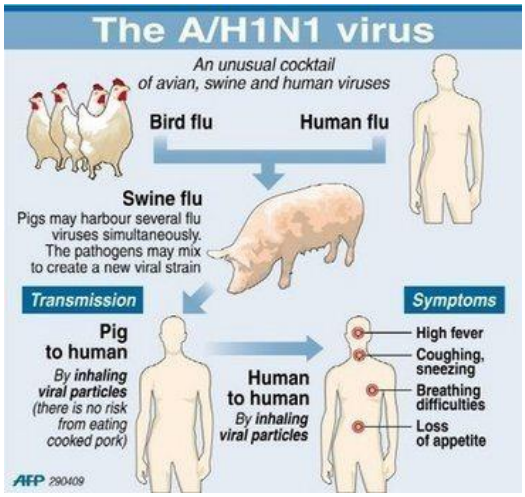

Fig: 2: Reproduced from https:// parenting healthy babies .com/swine-flu- symptoms -in- precautions- and-treatment –children/

TRANSMISSION [13]:

Influenza A virus is transmitted through respiratory secretions during coughing and sneezing. Apart from respiratory secretions other body fluids also probable to infectious varies discharges like diarrheal stool, saliva, vomits and urine.

Transmission between pigs:

Mostly swine flu transmission takes place from infected pigs to uninfected pigs through direct contact. In addition to that touching nose, or dried mucus in pigs, coughing and sneezing of pigs through aerosols virus transmitting within few days fatly in the herd.

Transmission to human:

People who work in the poultry farm and swine farm the virus infection transmit from to swine to human. Meat producers and veterinarians although having the risk of infection but lower rate compared to farm workers.

In human person to person pandemic swine flu spreading through touching skin, coughing, sneezing, hugging, kissing, caring the child or someone, sharing the drinking glasses or eating materials with someone and going to crowd places. Even the infected person where touching the places or towel unknowingly if you are touching the same place the virus will infect you.

Incubation period: range from 1-7 days.

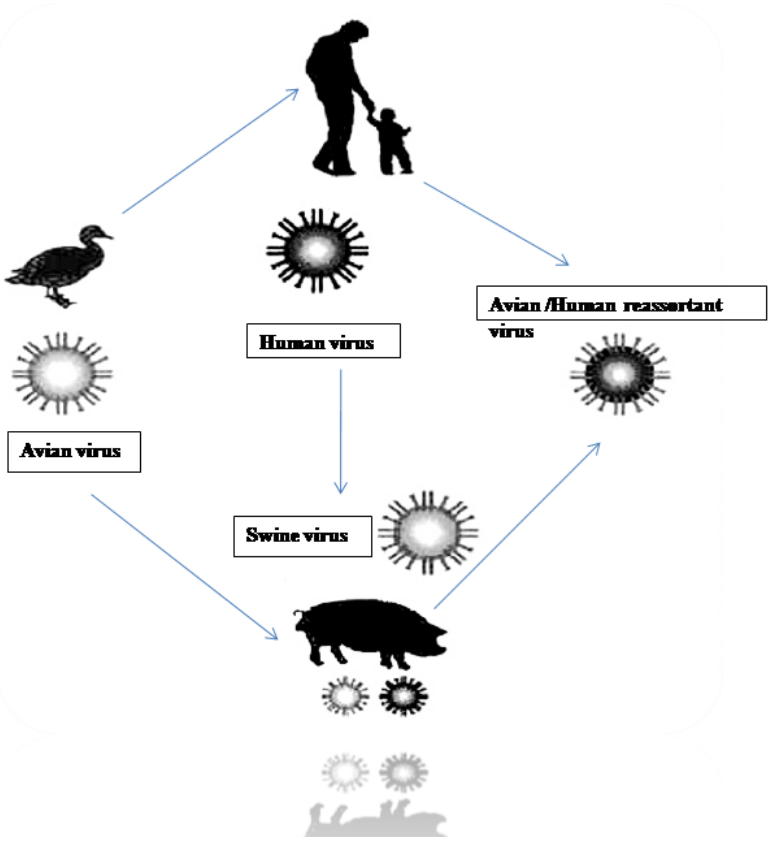

Fig: 3: Reproduced from slideshare.net; Pigs turn as "mixing vessel" and wild/wandering birds are the natural pools for influenza A viruses. Genes wrapping can occur in pigs between avian, swine and human viruses, which is the reason for the development of present novel H1N1 influenza A virus (swine flu virus) accountable for pandemic in humans, though looking moderately severe at present [14].

DIAGNOSIS [15]:

- ✓ Laboratory available test:
- ✓ Real time RT-PCR
- ✓ The gold standard test
- ✓ Typing using haem
- ✓ Viral culture
- ✓ Immunofluorescent antibody test
- ✓ Virus genome sequencing
- ✓ Rapid antigen test

Out of these tests the Centre for disease control and prevention recommends for confirmation diagnostic test is real time RT-PCR. Viral culture is diagnostic but it is usually very slow to manage the clinical guide. Rapid antigen tests sensitivity detecting the influenza virus probably similar or lower than the seasonal influenza. Immunofluorescent antibody testing is diagnostic but negative test does not exclude have unclear sensitivity to detect this virus. In the laboratory test sample should be taken from deep nasal passages, nasopharynx, throat or bronchial aspirate to detect the test.

TREATMENT [16]:

The Government hospitals storing the medicine for influenza virus. The different ways of its treatment are as follows:

- ✓ Antiviral drugs- Neuraminidase inhibitor antiviral medications (example, Oseltamivir, Zanamivir), peramivir amantadine, rimantadine.
- ✓ Immunization by vaccines.
- ✓ Possible herbal therapy (example, Elderberry, Japanese wasabi leaves, Tulsi etc.)

Neuraminidase inhibitor antiviral medications select the early phase of the infection. Still this strain is resistant to adamantine, such as amantadine and rimantadine in Canada, United States.

Oseltamivir (Tamiflu):
It is having active principle substance oseltamivir carboxylate, hydrolyzed by liver 6–10 h. Neuraminidase inhibitor, helping as a competitive inhibitor of sialic acid, found on the surface proteins of normal host cells and blocking the activity of the neuraminidase, prevents new viral particles from produced by infected cells[17]. **Dose:** Tamiflu (75-mg capsule) should be taken twice a day for 5 days.

Zanamivir (Relenza):
The bioavailability of the drug is 10–20% by inhalation, compared with 2% by oral administration. The elimination half-life in serum of zanamivir is about 2–5 h. The mechanism of action is analogous to oseltamivir. Dose: Two inhalations (5mg each) of Relenza should be administered twice in a day (i.e. 20mg/day) for 5 days (https://www.drugs.com/monograph/zanamivir.html).

PRECAUTION:
It is not recommended for treatment for patients with chronic airway disease or asthma as it can induce bronchospasm.

Table: 1: Represented the drugs and its doses for the treatment of swine flu.

Agent	Group	Treatment	Chemoprophylaxis
Oseltamivir	Adults Children ≥12 months 15 kg or less 15—23 kg 24—40 kg >40 kg	75 mg capsule twice daily for 5 days 60 mg per day divided into 2 doses 90 mg per day divided into 2 doses 120 mg per day divided into 2 doses 150 mg per day divided into 2 doses	75 mg capsule once daily 30 mg once daily 45 mg once daily 60 mg once daily 75 mg once daily
Zanamivir	Adults Children	Two 5 mg inhalations (10 mg total) twice daily Two 5 mg inhalations (10 mg total) twice daily (age, 7 years or older)	Two 5 mg inhalations (10 mg total) once daily Two 5 mg inhalations (10 mg total) once daily (age, 5 years or older)

Oseltamivir is having some side effect when you are using more than 300mg/day. Such as
(Transient nausea, vomiting). Rarely may it cause bronchitis, insomnia and vertigo. Less commonly angina, pseudo membranous colitis and peritonsillar abscess have also been reported. The reported state that occasionally causing anaphylaxis and skin rashes. Once in a while Vomiting, abdominal pain, epistaxis, bronchitis, otitis media, dermatitis and conjunctivitis have also been pragmatic in children.

(ii) Immunization by vaccines
Vaccines administration helps to control the virus progress. Single dose vaccination enough to produce antibodies within about10 days. There are two types of vaccines are available namely:
Trivalent Inactivated Influenza Vaccine (TIV) administered via injection, Live Attenuated Influenza Vaccine (LAIV) administered via nasal spray. LAIV is not preferred for below 2 years and above 49 years of age [18].

Alternative Treatment

Homeopathy: without any side effects Homeopathy can heal and both put a stop to swine flu. In India nearly more than 700 people effectively cure with Homeopathy medicine.

Ayurveda [19]: "Flu-go" formulation prepared by The Panchgavya Medical Research Centre, Jodhpur. It is very effective and secure than the allopathic treatment. Some available formulations such as;

Table: 2: Represented Ayurveda formulations used for the treatment of swine flu.

S,no	**Ayurveda** formulations	S.no	**Ayurveda** formulations
1	*Chyavanprash,*	2	*MallaSindura*
3	*Laxmivilas rasa*	4	*Samirpannaga Rasa,*
5	*Haridrakhand*	6	*PrahariPippali*
7	*Sitopladi Churna*	8	*ShwasKuthar Rasa*
9	*TalisadiChurna*	10	*Shwas Kasa*
11	*LavangadiGutika*	12	*Chintamani Rasa*

POSSIBLE HERBAL THERAPY:

Tulsi (*Ocimum sanctum*)

It is otherwise called as holy basil. In few countries not well developed. So they are using tradition medicine to cure H1N1. The main chemical constituents separated from the leaves are Ursolic acid, apigenin and luteolin. Some formulations are available in the market. It improves the immunity and metabolic functions as well as in the management of respiratory problems (Shwas –Kasa) [20].

Elderberry (*Sambucus nigra*)

It is an herb having anti-viral properties is a great remedy for flu symptoms when taken in the form of tincture, cordial or syrup to fight off the flu virus. These remedies prepared from dry or fresh berries. Chemical constituents are: Flavonoids (natural antioxidants to protect from free radicals to dame the body cells) Anthocyanins (ability to stimulate the production of cytokines to increase body's immune system)

Formulation: Example, Sambucol, the syrup available in the market. It prevent the spreading of virus by binding with virus before enter into the walls of the cell.

Japanese wasabi (*Wasabia japonica*)

It is having winter and summer leaves. Summer leaves greater than winter leaves, winter leaves used for spice but summer leaves using as an antiflu medicine.

Other herbal plants used around the world to protect against swine flu are enlisted as below:

- ✓ Liquorice (*Glycyrrhiza glabra*)
- ✓ Lemon Balm (*Melissa officinalis*)
- ✓ Garlic (*Allium sativum*)
- ✓ Juniper (*Juniperus*, various species)
- ✓ Shiitake (*Lentinus edodes*)
- ✓ Ginger (*Zingiber officinale*)
- ✓ Red fleshed potatoes (*Solanum tuberosum* ssp. tuberosum and *S.tuberosum* ssp. Andigena)

SIDDHA SYSTEM [21]:

The traditional Siddha system has very effective medicines for the prevention and treatment of swine flu without any side effects on the users a decoction made of Tulsi (Ocimum tenuiflorum), Karpooravalli (Plectranthus amboinicus), Black Pepper (Piper nigrum), Cloves (Eugenia aromaticum), Cardamom (Elettaria cardamom) and Honey (Apis mellifera) would be effective for preventing the swine flu. The ingredients should be boiled in one liter of water and then filtered. An adult should take 150ml pf the filtered portion once in a day while a child could be given 75ml. it could be taken for about 7 to 10 days. Other siddha preparation for treating an infected person includes crushing hundred gm each of Nilavembu, Seenthil, Adothoda, Vishnu Karanthai, and Parpadhan to make into a powder. Take 50 grams of the powder and heat it adding 1litre of water. The infected adult should take 150ml while a child could be given 75 ml for 7 to 10 days.

SUPPORTIVE THERAPY:

Parenteral iv Fluids, nutrition, electrolytes, Oxygen therapy/ ventilator support, Antibiotics for secondary infection, Vasopressors for shock, Paracetamol or ibuprofen is prescribed for fever, myalgia and headache. Patient is advised to drink plenty of fluids. Smokers should avoid smoking. For sore throat, short course of topical decongestants, saline nasal drops, throat lozenges and steam inhalation may be beneficial.

Salicylate / aspirin are strictly contraindicated in any influenza patient due to its potential to cause Reye's syndrome. The suspected cases would be constantly monitored for clinical /radiological evidence of lower respiratory tract infection and for hypoxia (respiratory rate, oxygen saturation, level of consciousness).

Patients with signs of tachypnea, dyspnea, respiratory distress and oxygen saturation less than 90 per cent should be supplemented with oxygen therapy. Types of oxygen devices depend on the severity of hypoxic conditions which can be started from oxygen cannula, simple mask, partial rebreathing mask (mask with reservoir bag) and non-rebreathing mask. In children, oxygen hood or head boxes can be used (https://www.researchgate.net/profile/Sunit_Singhi/3) .

HOME REMEDY FOR SWINE FLU:

Garlic is a multipurpose herb, curing many diseases. It is having allicin chemical constituent act as antioxidant. It improves our body immunity. It is a valuable home remedy for swine flu. Hence empty stomach in the morning 2 garlic pods with warm water taken useful for protect the body against Influenza virus. Ginseng is having positive impact on the viral strains of disease. It have been reported that in recent studies, very effective treatment for H1N1 influenza in recent studies. Swine Flu patients can drink ginseng tea every day. (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3286589/)

PREVENTION:

1. Washing hands regularly with soap, getting plenty of sleep, exercising often, managing stress, drinking liquids, eating a balanced diet, refraining from touching surfaces who may have Swine Flu.
2. If you are not having soap and water clean the hand with alcohol based wash.
3. Don't close with Swine flu sick people. Be sure to stay away from crowds if there is a swine flu outbreak in your area. Usually you should stay after 6 feet distance from the sick people.
4. Avoid touching your eyes, nose, or mouth
5. If a person infected, have to follow doctor instructions. During coughing, sneezing use tissue to avoid to spread infection to others. Have to take rest in the home separately, limit to contact with people, wash the hands and face regularly.
6. Patients should not go to people gathering places such as; school or college classes, church services, sporting events, concerts, social and cultural celebrations, weddings, conferences, and other similar activities attended by relatively large groups of people.
7. The person with illness should not travel airport and public transport vehicle. Quarantine will work with the airline and local and state health departments to assist with medical transportation of the patient upon arrival, disease control and containment measures, passenger and team notification and inspection activities, and airline disinfection procedures.
8. Infected person should wear face masks to prevent spread to others.
9. Adult patients should be discharged 7 days after symptoms have subsided. Children should be discharged 14 days after symptoms have subsided. The family of patients discharged earlier should be educated on personal hygiene and infection control measures at home; children should not attend school during this period.
10. Breastfeeding mothers with swine flu symptoms should express their breast milk, and the child should be fed by someone else.

TYPES OF FACE MASKS AND RESPIRATOR:

Facemask refers to disposable masks cleared by the U.S. Food and Drug Administration (FDA) for use as medical devices;

- One type is affixed to the head with two ties, conforms to the face with the aid of a flexible adjustment for the nose bridge and may be flat/pleated or duck-billed in shape.
- Second type of facemask is pre-molded, adheres to the head with a single elastic band and has a flexible adjustment for the nose bridge.
- A third type is flat/pleated and affixes to the head with ear loops.

CONCLUSION:

Swine Flu or the Influenza A (H1N1) flu, an very much spreadable acute respiratory disease of the pigs, is produced by one of the abundant swine influenza A strains and is exceedingly contagious. The transmission of the virus is from person-to-person and is similar to the way in which seasonal influenza extents. Swine flu is a viral infection which affects the public health problem in worldwide. In India many people infected by swine flu in the month of October and November 2018. Manifestation of swine flu has been stated from every part of the world like mid-western United States, Canada, Mexico, South America, Kenya, China, Taiwan, Japan, and several parts of Eastern Asia including India. This seasonal flu is produced by influenza A, B, and C viruses and accounts for about 4 to 5 million cases of severe illness, and about 260,000 to 500,000 of deaths yearly in worldwide. It has been projected that the total yearly economic burdens of seasonal influenza epidemics amounted to billions. In swine, multiple A (H1N2) virus reassortment have involved in genetic material from avian, swine, and human influenza viruses and have made multiple A (H1N2) reasserting viruses with differing genetic compositions over time. In humans, the A (H1N2) virus has also developed as a consequence of the reassortment of human A (H1N1) and A (H3N2) strains, leading to circulation of A (H1N2) viruses. There are some vaccines available to protect the humans against swine flu. We can help inhibit the spread of germs that cause respiratory illnesses like influenza by masking our nose and mouth with a tissue paper or other mask materials when we cough or sneeze. Throw the tissue paper in the garbage properly after we use it. Wash our hands frequently with soap and water. Specifically after we

cough or sneeze. We can also use alcohol-based hand cleaners. Avoid touching our eyes, nose or mouth because germs spread by this way. At last we can try to avoid close interaction with affected or sick people. We must be stay home from work or school if we are sick or infected by influenza virus. Finally the peoples should be following the preventive measures, vaccination and chemoprophylaxis is important for preventing the spread of this disease. Some strain of this virus having resistant to antiviral agents also. Hence we need to control Swine Flu by upcoming research studies.

REFERENCES:

1. Ravi Shekhar, Pooja Sharma, Lalit Kumar Tyagi, A.K. Gupta and M.L. Kori. Swine Flu (Swine Influenza-A (H1N1) Virus): A Review. *Global Journal of Pharmacology*, 3 (3): (2009), 131-136.
2. Lim Boon H. Mahmood Tahir A. The Journal of Obstetrics and Gynecology of India (July–August), 61(4) (2011), 386–393.
3. Jonges, M, Emergence of the Virulence-Associated PB2 E627K Substitution in a Fatal Human Case of Highly Pathogenic Avian Influenza Virus A (H7N7) Infection as Determined by Illumina Ultra-Deep Sequencing. *Journal of Virology*. 88(3): (2014), 1694–1702.
4. Jeffery K. Taubenberger and David M. Morens, 1918: Influenza: the Mother of All Pandemics *Emerg Infect Dis*. Jan; 12(1): (2006), 15–22.
5. Joel C. Gaydos, Franklin H. Top, Jr, Richard A. Hodder, and Philip K. Russell, Swine Influenza A Outbreak, Fort Dix, New Jersey, 1976, *Emerg Infect Dis*. Jan; 12(1): (2006), 23–28.
6. Jaggareddy Gari Manasa Reddy, K. Prathyusha, M. Venkataswamy, Alluri Ramesh: Spreading of Swine flu disease: Past and Present; *Res. J. Pharma. Dosage Forms and Tech.*; 10(2): 7(2018), 0-78.
7. Himangshu Deka, Durbba Natha, Arif Uddinb, Supriyo Chakraborty. DNA compositional dynamics and codon usage patterns of M1 and M2 matrix protein genes in influenza A virus. Infection, Genetics and Evolution.67; (2019): 7-16.
8. Iwan A. T. Schaap, Frédéric Eghiaian, Amédée des Georges, and Claudia Veigel Effect of Envelope Proteins on the Mechanical Properties of Influenza Virus; *J Biol Chem*. Nov 30; 287(49): (2012), 41078–41088.
9. Calore EE, Uip DE, Perez NM. Pathology of the swine-origin influenza A (H1N1) flu. *Pathol. Res. Pract.* Feb 15; 207 (2): (2011), 86-90.
10. Jaiswal Amit, Kumar Abhinav, Soni K. Rohit, Patidar Rohit.Swine Flu (H1N1) virus, prevention and their treatment. *A Review. International Research Journal of Pharmacy*. 2 (5); (2011); 88-90.
11. Priyanka Lokwani, Pramod Kumar, Yozana Upadhyay, Stuti Gupta, Renu Solanki and Nisha Singh. Swine Flu: An Overview. *Journal of Applied Pharmaceutical Science* 01 (04); (2011): 29-34.
12. Gautam Rawal, Sankalp Yadav, Raj Kumar, Sujana R. Swine Flu (H1N1 Influenza A): A concise review. *Indian Journal of Immunology and Respiratory Medicine*, April-June (2017); 2 (2):29-32.
13. Megha Kadam. A Review article on Swine Flu. *Current Research in Pharmaceutical Sciences*; 05 (01): (2015), 12-16.
14. R.V.S. Pawaiya, K. Dhama, M. Mahendran1 and B.N. Tripath Swine flu and the current influenza A (H1N1) pandemic in humans: A review, *Indian J. Vet. Pathol*. 33(1): (2009), 1-17.
15. Manish Sinha. Swine flu. *Journal of Infection and Public Health* 2, (2009), 157—166.
16. Suresh Kumar, Sunil Sharma, Suman. Swine Flu and its possible therapy. Interna*tional Journal of Pharmaceutical Sciences Review and Research*. Vol 3, Issue 2, July – August (2010); 60-65.
17. Babu, Y.S., Chand, P., Banta, S., Kotian, P. BCX-1812 (RWJ-27021).Discovery of a novel, highly potent, orally active and selective influenza virus neuraminidase inhibitor through structure-based drug design. *J. Med. Chem*. 43, (2000). 3482–3486.
18. Haq K, McElhaney JE. Immunosenescence: Influenza vaccination and the elderly. *Current opinion in immunology*; 29: (2014), 38–42
19. Trivedi Atal Bihari, Mahajan Nitin, Chaudhary Robin. Swine Flu- An Ayurveda Approach. *International Ayurvedic Medical Journal*, Volume 3; Issue 3; March- (2015).
20. Suresh Kumar, Sunil Sharma, Suman and Payal Jain, Swine Flu and its possible therapy, International Journal of Pharmaceutical Sciences Review and Research, Volume 3, Issue 2, July – August (2010).
21. Megha Kadam, A Review article on Swine Flu; *Current Research in Pharmaceutical Sciences*; 05 (01): (2015), 12-16.
22. Jaggareddy Gari Manasa Reddy, K. Prathyusha, M. Venkataswamy, Alluri Ramesh Spreading of Swine flu disease: Past and Present ,*Res. J. Pharma. Dosage Forms and Tech.*; 10(2): (2018),70-78.