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REVIEW ARTICLE

Swine Flu and its Risk Management

Suryakant Verma[1]*, Mukesh Kumar[2], Vijay Kumar Sharma[3], T.S. Easwari[4]

[1,2,3]*Dr. K. N. Modi Institute of Pharmaceutical Education & Research, Modinagar-201204, Uttar Pradesh, India.*

[4] *IIMT College of Medical Sciences, O-Pocket Ganga Nagar, Meerut-250001, Uttar Pradesh, India*

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ABSTRACT

The H1N1 flu virus (referred to as "swine flu" early on) is a new influenza virus strain that is causing illness in people. Swine flu has been confirmed in a number of countries. This new virus strain was first detected in people in the US in April 2009 and is spreading from person-to-person worldwide, probably in much the same way that regular seasonal influenza viruses spread. On June 11, 2009, the World Health Organization (WHO) declared that a pandemic of H1N1 flu was underway. The scientists say this is a "quadruple reassortant" virus. This is a dangerous scenario in the 21st century. In India day by day the graph of infected person has been climbed up so, it is important to take into consideration about this disease as it may prove deadly one. Currently available drugs like neuraminidase inhibitors such as Tamiflu (oseltamivir), Zanamivir like antivirals have potential and resistance problem. This article collects the information about the recommended available drugs and herbal therapy like *Sambucus nigra*, *Wasabia japonica*, tuberosum and *Solanum tuberosum* ssp. andigena and various immune enchancers like *Ocimum sanctum*, *Glycyrrhiza glabra*, *Allium sativum*, *Melissa officinalis* etc. This article collects the brief information about this particular disease and about their method of prevention which directly or indirectly provides help to the peoples of various countries.

KEYWORDS

H1N1, Swine flu, Quadruple reassortant, Tamiflu

INTRODUCTION

Swine flu, also known as Influenza-A (H1N1), pig influenza, swine flu, hog flu and pig flu is a new influenza virus causing illness in people. It infects the respiratory tract and result in nasal secretions, a barking like cough, decreased appetite and listless behavior. It has been found that this new virus has gene segments from the swine, avian and human flu virus genes, hence named "swine flu".

*Address for Correspondence:
Suryakant Verma,
Assistant Professor, Dept of Pharmaceutics, Dr. K. N. Modi Institute of Pharmaceutical Education & Research, Modinagar-201204, Uttar Pradesh, India.
E mail ID: surajmeerut@gmail.com

The scientists calls this a 'quadruple reassortant" virus and hence this new (novel) virus is christened "influenza-A (H1N1) virus." This new virus strain was first detected in people in the US in April 2009 and is spreading from person-to-person worldwide, probably in much the same way that regular seasonal influenza viruses spread. On June 11, 2009, the World Health Organization (WHO) declared that a pandemic of 2009 H1N1 flu was underway. As on 8th June, 2009, World Health Organization has reported 25,288 laboratory confirmed cases of influenza A/H1N1 infection with 139 deaths from 73 countries spread over America, Europe, Asia and Australian continent[1].

As the situation developed, the Food and Drug Administration (FDA) instituted an H1N1 incident management system to coordinate actions to protect the public's health. Through the incident management system, FDA has created seven crosscutting teams to mitigate an H1N1 outbreak. The seven teams consist of the vaccine team, the antiviral team, the *in vitro* diagnostics team, the personal protective equipment team, the blood team, the drug shortage team and the consumer protection team. This article will focus on the work of the vaccine and antiviral teams with the recent approval of the H1N1 vaccines and the recommendations for safely using the vaccines and antiviral medications[2, 24].

Transmission of Virus to Human

Transmission of the virus from pigs to humans is not common and does not always lead to human influenza, often resulting only in the production of antibodies in the blood. If transmission does cause human influenza, it is called zoonotic swine flu. People with regular exposure to pigs are at increased risk of swine flu infection. The meat of an infected animal poses no risk of infection when properly cooked[3].

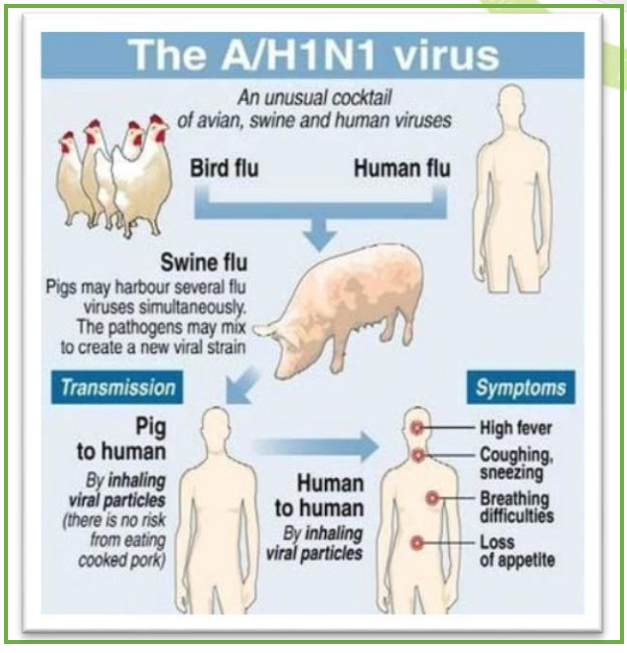

Figure 1: Models for the role of pigs in interspecies transmission and adaptation of influenza viruses. Pigs serve as reservoirs of H1N1, H3N2 and H1N2 influenza viruses which can be transmitted to humans.

Symptoms of Swine Flu

The U.S Centers for Disease Control and Prevention (CDC) includes following symptoms for Swine-Flu infection[4].

- Fever (94%)
- Cough (92%)
- Sore throat (66%)
- Diarrhea (25%)
- Vomiting (25%)
- Myalgia and joint pains.

Infants and elderly are more susceptible to serious infection. Pregnant women, people with chronic medical problems such as asthma, cardiovascular diseases, and diabetes are at high risk. The most common causes of death due to Swine-Flu are[5]:

- Respiratory failure
- Pneumonia
- Sepsis
- Dehydration (from excessive vomiting)
- High fever
- Electrolyte imbalance.

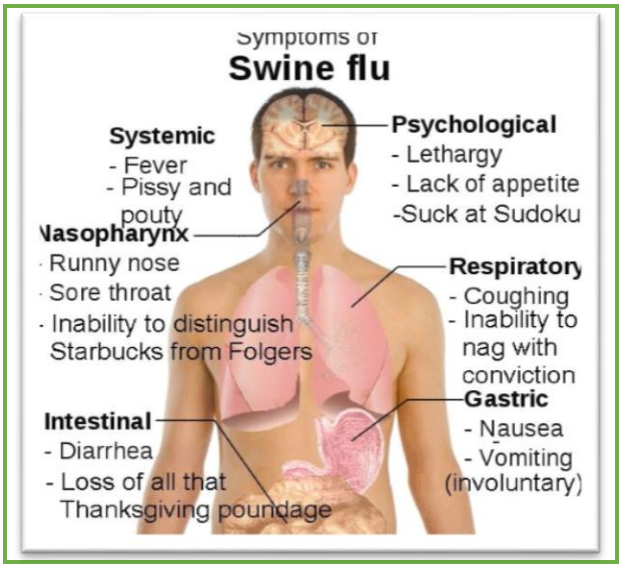

Figure 2: Main symptoms of swine flu in humans[5]

Infection Period

It should be considered that persons with Influenza H1NI infection, potentially infectious from 1 day before to 7 days following illness onset or until symptoms resolve.

Children, patients with lower respiratory tract infections, elderly and immunocompromised patients might be infectious for up to 10 days or longer[6,7]. This is due to low cytotoxic T lymphocyte activity which is responsible for viral clearance and recovery from infection[8].

Cytotoxic T lymphocyte activity declines in the elderly as well as in immunocompromised individuals so that viral shedding could persist longer in them[9]. The potential for persons with asymptomatic infection to be the source of infection to others is unknown but should be investigated.

Diagnosis of Swine Flu

The Centers for Disease Control and Prevention (CDC) recommends real time RT-PCR as the method of choice for diagnosing H1N1[10]. This method allows a specific diagnosis of novel influenza (H1N1) as opposed to seasonal influenza. Near-patient point of care tests are in development[11]. The major tests that are being used for the diagnosis of Swine-Flu are:

- Nasopharyngeal swab for viral culture
- The gold standard test
- Typing using haem
- Aggultination inhibition and immunofluroscence
- Rapid immune fluorescence test
- Viral culture
- Real-time Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR)

Usually, a quick test (for example, nasopharyngeal swab sample) is done to see if the patient is infected with influenza A or B virus. If the test is positive for type B, the flu is not likely to be Swine-Flu (H1N1). If it is positive for type A, the person could have a conventional flu strain or Swine-Flu (H1N1).

The current protocols (As per WHO guidelines revised on 23 November, 2009) are available for testing and detection of virus[12]:

- Influenza A type –Specific Conventional and Real time –PCR
- Pandemic (H1N1) 2009, Virus Specific Conventional and Real time PCR
- CDR Real time (RT-PCR) Protocol for detection and characterization of Pandemic (H1N1) 2009
- Seasonal influenza (H1N1and H3N2) and Avain Influenza A (H5,H7,H9) Real time RT-PCR

Mechanism of Viral Infection

It can be represented by the diagram which is as given below:

The 469 amino acid long neuraminidase (NA) protein is essential for the release of the viral particle from the outer membrane of infected cells by cleaving sialic acid from host glycoproteins that are recognized by the viral haemagglutinin. As a type II, trans membrane protein, it is N-terminally attached to the membrane. It consists of a tiny cytoplasmic tail at the N-terminus (residues 1 to 6) followed by the trans membrane region (residues 7 to 34) that is also responsible for translocation of the protein.

Next, a presumably unstructured linker region (residues 35 to 82) connects the membrane anchor to the catalytic neuraminidase domain .Such unstructured linker regions are rich in small and polar residues and often harbour sites for posttranslational modifications. Probable posttranslational modification sites in the neuraminidase of the new strain are glycosylation motifs involving N88, N146 and N235, which correspond to residues that are also glycosylated in other subtype neuraminidases.

However, the minimal and non-specific consensus motif of glycosylation sites (Nx [ST]) is found in total 8 times in the new strain sequence with an apparent clustering (50%) in the unstructured linker region. Interestingly,

another putative novel glycosylation site N386, which is unique to the new strain, would be accessible on the surface, as seen in the structural models.

Comparing among all strains, the sequence variation is largest in the linker region, including large deleted segments. Nevertheless, this region harbours a cysteine that can be aligned over multiple NA subtypes and is conserved in N1-N5 and N8, but not in N6, N7 and N9.

Earlier reports assume that, at least in related viruses, cysteines in the non-globular region could be involved in intermolecular disulfide bridges. Alternatively, by analogy to other influenza proteins such as hem agglutinin and M2 protein, it cannot yet be excluded that cysteine C49 is palmitoylated and that the anchor localizes the protein to lipid rafts.[13]

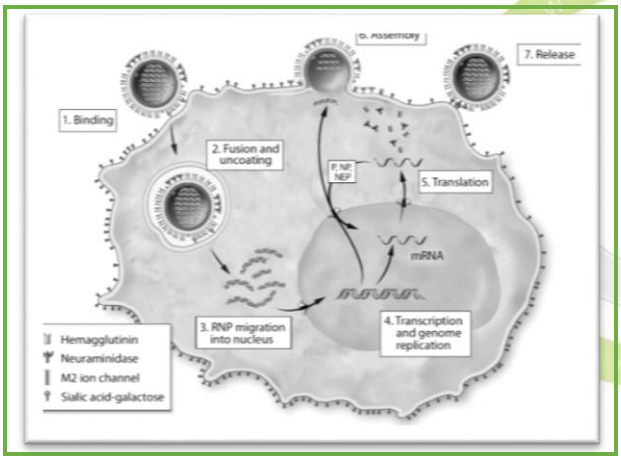

Figure 3: Viral infection cycle[23]

Prevention of Transmission to Humans

Transmission occurs mainly in swine farms where farmers are in close contact with live pigs. 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[14.] Few precautions to be taken by humans so as to prevent transmission are as given below:

- Cover your nose and mouth with a tissue when you cough or sneeze. Throw the tissue in the trash after you use it.
- Wash your hands often with soap and water, especially after you cough or sneeze. Alcohol-based hand cleaners are also effective.
- Avoid touching your eyes, nose or mouth. Germs spread this way.
- Try to avoid close contact with people having respiratory illness.
- If one gets sick with influenza, one must stay at home, away from work or school and limit contact with others to keep from infecting them. However, if one is having any respiratory distress, one should report to a nearby hospital.

A new vaccine against the 2009 H1N1 strain is being developed soon by ICMR and is expected to provide adequate protection.

Steps taken by the Government of India to Prevent Outbreak of this Flu in India

- The government has taken steps to detect early cases among the passengers coming from the affected countries either by air, road or ship.
- It has launched a massive mass media campaign to inform and educate people.
- Sharing information with the public through media.

Treatment

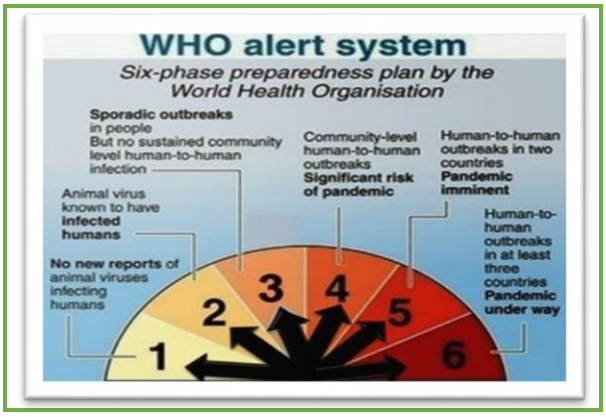

Figure 4: WHO alert system

The Government has in the designated hospitals stored medicines if required. It is strongly advisable not to take medicines on your own, as it will lower your immunity.

The different ways of its treatment are as follows:

A. Neuraminidase inhibitor antiviral medications (example, Tamiflu (oseltamivir) and Relenza (zanamivir)) [15]

B. Immunization by vaccines[2,13]

C. Possible herbal therapy (example, Elderberry, Japanese wasabi leaves, Tulsi etc.)[16-20]

A. Neuraminidase inhibitor antiviral medications

These medications target the early phase of the infection. However, this strain is resistant to adamantanes, such as amantadine and rimantadine[15.]

Tamiflu (oseltamivir) and Relenza (zanamivir) are two FDA-approved antiviral drugs indicated for the prevention and treatment of influenza.

On September 24, 2009, FDA issued a Public Health Advisory alerting health care professionals that the Agency has received reports of dosing errors with Tamiflu for Oral Suspension, specifically where dosing instructions for the patient do not match the dosing dispenser.

In general, prescriptions for liquid medicines are written in milliliters (ml) or teaspoons, while Tamiflu is dosed in milligrams (mg). The dosing dispenser packaged with Tamiflu has markings only in 30, 45, and 60 mg.

If prescription instructions specify administration using ml, the dosing device accompanying the product should be replaced with a measuring device (e.g., a syringe) calibrated in ml.

Specific Considerations for Tamiflu Dosing for Children over One Year of Age:

1. Dosing should be prescribed in mg, according to information provided in the table below. Caregivers for children should use the dosing dispenser packaged with the medication, unless otherwise directed by a health care provider.

2. If the dosing dispenser packaged with Tamiflu oral suspension is lost or damaged, or if the prescriber wishes to use volume-based dosing, appropriate dosages in ml are also provided in the table. In these cases the prescriber and pharmacist should ensure that a dosing dispenser, such as an oral syringe calibrated in ml, is given to the patient or caregiver with instructions for use. The dosing dispenser packaged with the product should be discarded.

3. Prescribers should avoid prescribing Tamiflu oral suspension in teaspoons. This can lead to inaccurate dosing. If a prescription is written in teaspoons, the pharmacist should convert the volume to ml and ensure that an appropriate measuring device, such as an oral syringe calibrated in ml, is provided. The dosing dispenser packaged with the product should be discarded.

Emergency Use of Tamiflu in Infants Less than One Year of Age

- Tamiflu for Oral Suspension is approved for use in the treatment and prophylaxis of influenza in pediatric patients 1 year of age and older. In certain cases, the FDA has authorized emergency use of Tamiflu in infants less than one year of age.
- Health care providers should be aware that there are limited data on safety and dosing when considering Tamiflu use in a seriously ill, infant with confirmed 2009 H1N1 influenza virus infection, or in one that has been exposed to a confirmed 2009 H1N1 influenza case. Infants should be carefully monitored for adverse events when Tamiflu is used.
- The pharmacokinetic data to guide dosing in infants less than 3 months of age are also extremely limited.

Table 1: Dose of Tamiflu for Oral Suspension (12 mg/mL) for Treatment of Influenza in Pediatric Patients One Year or Older by Weight

Body Weight (kg)	**Body Weight** (lbs)	**Recommended Dose for 5 Days** (If using the dosing device supplied with the product)	**Dose** (mL) (If using a syringe marked in mL or cc)	**Number of Bottles of Tamiflu needed to Obtain the Recommended Doses for a 5 Day Regimen**
≤ 15 kg	≤ 33 lbs	30 mg twice daily	2.5 mL	1
>15 kg to 23 kg	>33 lbs to 51 lbs	45 mg twice daily	3.8 mL	2
>23 kg to 40 kg	>51 lbs to 88 lbs	60 mg twice daily	5.0 mL	2
>40 kg	>88 lbs	75 mg twice daily	6.2 mL	3

Table 2: Recommended Doses* for Infants Less than One year of age Using Tamiflu Oral Suspension

Age	**Dose (mg)**	**Volume per Dose (12 mg/mL)**	**Treatment Dose Required (for 5 days)**	**Prophylaxis Dose Required (for 10 days)**
6 - 11 months	25 mg	2 mL	2 mL twice daily	2 mL once daily
3 - 5 months	20 mg	1.6 mL	1.6 mL twice daily	1.6 mL once daily
< 3 months	12 mg	1.0 mL	1.0 mL twice daily	Not recommended unless critical

* Doses recommended for treatment of infants in the FDA Emergency Use Authorization are based on data from an ongoing NIH study evaluating treatment doses of 3.0 to 3.5 mg/kg twice daily.

Table 3: Total Volume of Suspension Needed for Correct Dosing

Body Weight (kg)	**Body Weight (lbs)**	**Total Volume to Compound per patient (mL)**
≤ 15 kg	≤ 33 lbs	30 mL
16 to 23 kg	34 to 51 lbs	40 mL
24 to 40 kg	52 to 88 lbs	50 mL
≥ 41 kg	& ≥ 89 lbs	60 mL

Table 4: Dosing Chart for Pharmacy-compounded Tamilfu

Body Weight (kg)	**Body Weight (lbs)**	**Dose (mg)**	**Volume per Dose (15 mg/mL)**	**Treatment Dose Required (for 5 days)**	**Prophylaxis Dose Required (for 10 days)**
≤ 15 kg	≤ 33 lbs	30 mg	2 mL	2 mL twice daily	2 mL once daily
16 to 23 kg	34 to 51 lbs	45 mg	3 mL	3 mL twice daily	3 mL once daily
24 to 40 kg	52 to 88 lbs	60 mg	4 mL	4 mL twice daily	4 mL once daily
≥ 41 kg	≥ 89 lbs	75 mg	5 mL	5 mL twice daily	5 mL once daily

Table 5: FDA Approved H1N1 Vaccines

Proper Name	Route of Adminis-tration	Virus	Manufac turer	How Supplied	Indication
Influenza A (H1N1) 2009 Monovalent Vaccine	Injectable	Inactivate d	CSL Limited	0.5 mL preservative-free single-dose, prefilled syringe 5 mL multi-dose vial[1]	Active immunization of persons ages 18 years of age and older against influenza disease caused by pandemic (H1N1) 2009 virus.
Influenza A (H1N1) 2009 Monovalent Vaccine	Injectable	Inactivate d	Novartis Vaccines and Diagnosti cs Limited	0.5 mL single-dose, prefilled syringe[2] 5 mL multi-dose vial[1]	Active immunization of persons 4 years of age and older against influenza disease caused by pandemic (H1N1) 2009 virus.
Influenza A (H1N1) 2009 Monovalent Vaccine	Injectable	Inactivate d	Sanofi Pasteur, Inc.	0.25 mL preservative-free, single-dose, prefilled syringe and single-dose vial 0.5 mL preservative-free, single-dose, prefilled syringe and single-dose vial 5 mL multi-dose vial[1]	Active immunization of persons 6 months of age and older against influenza disease caused by pandemic (H1N1) 2009 virus.
Influenza A (H1N1) 2009 Monovalent Vaccine	Intranasal	Live, attenuated	MedImm une LLC	0.2 mL pre-filled, single-dose intranasal sprayer	Active immunization of individuals 2-49 years of age against influenza disease caused by pandemic (H1N1) 2009 virus.

[1] Contains Thimerosal as preservative

[2] Thimerosal, a mercury derivative used during the manufacture, is removed by subsequent purification steps to a trace amount (≤ 1 mcg mercury per 0.5 mL dose).

- Therefore, Tamiflu should **not** be routinely used for prophylaxis in this age group. Tamiflu should be reserved for cases in which the exposure is significant and the risk of severe illness is considered high.
- Current age-based dosing recommendations are not intended for premature infants. Premature infants may have slower clearance of drug due to immature renal function, and doses recommended for full term infants may lead to very high drug concentrations in this age group. Dose recommendations for premature infants are currently being evaluated.
- The following table provides dosing instructions for the emergency use of Tamiflu in Infants less than one year of age:

When dispensing Tamiflu oral suspension for infants younger than one year of age, **the oral dosing dispenser included in the product package should always be removed and replaced with an appropriate measuring device.** The pharmacist or other health care provider should provide an oral syringe capable of accurately measuring the prescribed milliliter (ml) dose and counsel the caregiver on how to administer the prescribed dose.

Emergency Compounding of an Oral Suspension from Tamiflu 75 mg Capsules (Final Concentration 15 mg/ml)

Commercially manufactured Tamiflu for Oral Suspension (12 mg/ml) is the preferred product for pediatric and adult patients who have difficulty swallowing capsules or where lower doses are needed. In the event that Tamiflu for Oral Suspension is not available, pharmacists may compound a suspension (15 mg/ml) from Tamiflu (oseltamivir phosphate) Capsules 75 mg using Cherry Syrup (Humco) or Ora-Sweet Sugar-Free (SF; Paddock Laboratories). Other vehicles have not been studied. **This compounded suspension should not be used for convenience or when the FDA-approved Tamiflu for Oral Suspension is available.**

The approved compounding procedure is included in the professional prescribing information and results in a 15 mg/ml suspension. Healthcare providers should note that the compounded suspension is a different concentration compared to commercially available Tamiflu for Oral Suspension, which has a concentration of 12 mg/ml. Pharmacists and health care providers should ensure that an appropriate dispensing device (i.e., one that measures volume in ml) is provided with the compounded suspension of Tamiflu.

Tables 2 and 3 provide the volume of compounded suspension (15 mg/ml) made from Tamiflu Capsules needed for a full treatment course based on the patient's weight, and the dosing chart for pharmacy-compounded Tamiflu suspension.

B. Immunization by Vaccines[2, 13]

On September 15, 2009, FDA approved four Influenza A (H1N1) 2009 Monovalent Vaccines for the active immunization of individuals against influenza disease caused by pandemic (H1N1) 2009 virus. As noted in Table 5, for the injectable vaccines, the virus is inactivated, split, and further purified while the intranasal vaccines contain a live, attenuated virus. The vaccines are available in formulations that contain thimerosal, a mercury-containing preservative, as well as preservative-free formulations.

a. Who Should Get Vaccinated?

In past pandemics, groups at increased risk for serious illness and death have differed by age and health status. With the current outbreak, the most vulnerable groups are:

1. Pregnant women
2. Health care workers and emergency medical responders
3. Any household contacts of children six months of age and younger
4. Children and young adults from six months to 24 years
5. People aged 25 to 64 years with underlying medical conditions (e.g. asthma, diabetes)

Immunizing these groups first will help contain the spread of the flu during the vaccination roll-out which may take a few months. Once public health authorities at the local level determine that the H1N1 influenza vaccine demand for the five target groups has been met, providers will be notified that they can administer the vaccine to healthy people ages 25 through 64 years. Once demand for H1N1 influenza vaccine among younger age groups is met, vaccination should be expanded to all people age 65 and older. Infants younger than six months should not receive the flu vaccine; therefore, it is important for infant caregivers be vaccinated and for families to take everyday actions to stay healthy.

b. Dosage Recommendations

Children Age Nine and Under

Currently available data suggest that children six months to nine years of age have little or no evidence of protective antibodies to the H1N1 2009 virus [20]. Based on these data, children nine years of age and younger should be administered two doses of the monovalent pandemic (H1N1) 2009 virus vaccine.

Adults and Children 10 Years of Age and Older

Adults should be administered one dose, as should children and adolescents 10 years of age and older, as they are expected to respond similarly to adults. Clinical studies are underway and will provide additional information about the optimal number of doses.

c. Contraindications

The manufacturers of the H1N1 vaccines use the same well-established, egg-based manufacturing processes that are used in the manufacturing of the seasonal influenza vaccine. Therefore, people who have a severe (life-threatening) allergy to chicken eggs or to any other substance in the vaccine should not be vaccinated. Patients should be advised to talk to their doctor before getting a flu vaccine if they:

1. Have ever had a severe allergic reaction to eggs;
2. Have ever had a severe allergic reaction to a previous flu vaccine; or
3. Have a history of Guillain-Barr Syndrome (GBS).

The Advisory Committee on Immunization Practices suggests using inactivated influenza vaccine for immunosuppressed persons and for household members, healthcare personnel, and others who have close contact with severely immunosuppressed individuals.

d. Adverse Events

The expected adverse events associated with H1N1 vaccine will be similar to those of the seasonal vaccine, potentially including a mild fever, body aches, and fatigue for a few days after the vaccine, and soreness at the injection site. The most common adverse events seen with administration of the nasal vaccine include runny nose or nasal congestion in recipients of all ages; fever more than 100 degrees Fahrenheit in children two to six years of age, and sore throat in adults. As with any medical product, serious adverse events may occur. Health professionals may report serious adverse events for vaccines to the Vaccine Adverse Event Reporting System (VAERS).[2,20.]

C. Possible Herbal Therapy

There are a lot of herbs have evaluated for the beneficial effects of swine flu which are described below as:

(a) Tulsi (*Ocimum sanctum*)

Figure 4: Tulsi

In some countries, though, vaccines are not as available and people are using traditional herbs to help protect against H1N1. Holy basil (*Ocimum sanctum*), called Tulsi in India, is being used in countries worldwide to help protect against swine flu. The main chemical constituents isolated from the leaves are Ursolic acid, apigenin and luteolin. Several formulations are available in the market.

It enhances the immunity and metabolic functions as well as in the management of respiratory problems (Shwas –Kasa)[19,20].

(b) Elderberry (Sambucus nigra)

Figure 5: Elderberry

Elderberry (*Sambucus nigra*), an herb with anti-viral properties are a wonderful remedy for flu symptoms when taken in the form of tincture, cordial or syrup to fight off the flu virus. It makes itself even more useful since these remedies can be made from dry or fresh berries.

Chemical constituents are:

- Flavonoids (natural antioxidants that work to protect the body's cells from the potential damage caused by free radicals)
- Anthocyanins (remarkable ability to stimulate the body's immune system by increasing the production of cytokines)

Formulation: Example, Sambucol, the syrup available in most health-food stores.

It shows the antiflu activity by binding with viruses before penetrating into the walls of cells, thus prevents the spreading of viruses [16,17].

(c) Japanese Wasabi

Figure 6: *Japanese wasabi* leaves

It has been found that the summer leaves of Japanese wasabi (*Wasabia japonica*) shows anti-influenza virus activity while winter leaves and rhizomes are generally used as a spice and for processed foods such as pickled wasabi. Since the leaf area of summer leaves is far greater than that of winter leaves, they are not used for food, and are discarded. Thus, on investigation, anti-influenza virus activity was found in these summer leaves as a new function. Seventy percent ethanol extracts of leaves harvested in July exhibited a high replication inhibition rate (98% or higher) in the type A strain (AH1N1, A/shimane/48/2002), its subtype (AH3N2, A/shimane/122/2002), and type B strain (B/shimane/2/2002).

Therefore, such extracts are expected to be a promising source of a novel anti-influenza virus Agent[18].

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)[21,22,24,25,26]

CONCLUSIONS

Influenza H1N1 virus is spreading rapidly through sustained human-to-human transmission in multiple countries. Infected person may be able to infect others beginning one day before symptoms develop and up to seven or more days after becoming sick. However, with efficient human to human transmission established and more than 48 countries involved, so a series of actions need to be put in place to contain the outbreak. Few of the antiviral drugs are available in the market for treating this wide spread infecting disease but due to their immense side effects, scientists are now, turn their attention towards herbal therapy. So through this article we tried to collect the brief information about this particular disease. We can play main role in the prevention of the transmission of this disease by following the main factors enlisted in the article.

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