

Study of Swine Origin Influenza A H₁N₁ Virus Infection in Maharashtra Population: A Prospective ApproachShirish Dnyandeo Chavan¹, Nitin S. Chitte²¹Professor and Head, Department of Tuberculosis and Respiratory Diseases, Prakash Institute of Medical Sciences and Research Centre, Urun Islampur, District Sangli Maharashtra – 415409²Assistant Professor, Department of Tuberculosis and Respiratory Diseases, Prakash Institute of Medical Sciences and Research Centre, Urun Islampur, District Sangli Maharashtra – 415409

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Conflict of interest: Nil

Abstract**Background:** The influenza pandemic occurred when a novel influenza virus with surface antigen hemagglutination (HA) and/or neuramidase (NA), to which the majority of humans have little or no pre-existing immunity, emerged in humans and was able to be transmitted efficiently from person to person.**Method:** 40 patients above 18 years of age who presented RT-PCR positives were studied. The hematological examinations included CBC, Hb%, S-creatinine, SGOT, SGPT, PH, and arterial blood gases FiO₂ and PaO₂. A chest x-ray with blood and urine cultures were also studied to confirm the severity of the H₁N₁ infection.**Results:** Clinical manifestation revealed 38 (95%) cough and fever, 25 (62.5%) had fever, and 23 (57.5%) had tachycardia and tachypnoea on auscultation. 12 (32.5%) had breathlessness; 9 (32.5%) had a sore throat; 19 (22.5%) had bodyaches; 3 (7.5%) had vomiting; 5 (12.5%) had diarrhoea; and 33 (82.5%) were fatigued. Co-morbidity was 8 (20%) type-II DM, 7 (17.5%) CKD, and 3 (7.5%) immune suppressed. Radiological observations showed that 18 (4.5%) had pneumonia, 13 (32.5%) had respiratory failure, 6 (15%) had ARDS, 10 (20%) patients were admitted to the ICU, 30 (75%) were non-ICU and non-invasive mechanical ventilation, and laboratory findings were 6 (15%) anaemic, 12 (30%) had leucopenia, 4 (10%) had thrombocytopenia, 8 (20%) had renal dysfunction, and 8 (20%) had reduced levels of SGPT. Elevated PH, Fio₂, and Pio₂ were observed in ICU-admitted positive patients and mortality cases were 11 (27.5%).**Conclusion:** A present pragmatic study of swine-origin influenza A H₁N₁ virus infection is pandemic, causes severe illness, and causes complications in patients with co-morbidities like type II DM, CKD, and immune suppressive patients. Hence, the present study will be helpful for clinicians to treat such patients efficiently to avoid morbidity and mortalities.**Keywords:** Influenza, H₁N₁, swine flu, co-morbidities, RT-PCR test.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Influenza, commonly referred to as the flu, is an infectious disease caused by RNA viruses of the family Orthomyxoviridae (the influenza viruses) that affects birds and mammals [1]. Swine influenza (also called Mexican flu, pig influenza, swine flu, hog flu, pig flu, stomach flu, or 24-hour flu) is an infection by one of several types of swine influenza virus. Swine influenza virus (SIV) or S-OIV (swine origin influenza virus) is any strain of the influenza family of viruses that is endemic in pigs [2]. In 2009, the known SIV strain included influenza C and the subtypes of influenza known as H₁N₁, H₁N₂, H₃N₁, H₃N₂, and H₂N₃ [3]. The most common symptoms of the diseases are chills, fever, sore throat, muscle pain, severe headache, coughing, weakness, fatigue, and general discomfort. In more serious influenza cases, influenza causes pneumonia, which can be fatal,

particularly for the young and the elderly. Patients with asthma, neurological disorders, diabetes, immune suppression, cardio-vascular diseases, chronic kidney disease (CKD), and COPD are more susceptible to getting the H₁N₁ infection [4].

Hence, an attempt is made to evaluate the various clinical manifestations in different age groups and in both sexes.

Material and Methods

40 (forty) patients admitted at Prakash Institute of Medical Sciences and Research Centre Urun Islampur District Sangli, Maharashtra – 415409 who presented signs and symptoms of swine-origin influenza A, H₁N₁ virus, were studied.

Inclusive Criteria

Confirmed H₁N₁ influenza virus detected by RT-PCR or culture. The patients gave written consent for treatment, and admissions were selected for study.

Exclusion Criteria

patients with influenza-like illness with negative RT-PCR for swine influenza and patients below 18 years. Immune-compromised patients were excluded from the study.

Method

Each patient's family history and occupation are recorded in the profile. In addition to this, associated diseases like type II DM, liver or lung diseases like COPD, and lung diseases during pregnancy were also noted. The H₁N₁ positive patients were admitted to their respective wards, and serious patients were admitted to ICU wards. The haematological examination included CBC, Hb%, serum creatinine transfinite (SGPT), PH, and arterial blood gases (FiO₂/PaO₂), which were also studied. A blood and urine culture, chest X-ray was carried out to study the severity of the disease. The duration of the study was from March 2021 to March 2023.

Statistical Analysis

The clinical manifestations were classified with a percentage H₁N₁ positivity in ICU admitted patients was compared with their mean value (SDI), and remaining laboratory findings were also classified by percentage. The statistical analysis was carried out in SPSS software. The ratio of males and females was 2:1

Observation and Results

Table 1: Clinical manifestations of H1N1 patients

A) 38 (95%) cough and fever, 25 (62.5%) fever, 23 (57.5%) tachycardia and tachypnea on auscultation, 13 (32.5%) breathiness, 9 (22.5%) Sore throat, 19 (47.5%) Body ache, 3 (7.5%) vomiting 5 (12.5%) diarrhoea, 33 (82.5%) fatigue.

B) Co-morbidities: 8 (20%) type-II DM. 7 (17.5%) CKD, 3 (7.5%) immune suppression,

C) Radiological findings: 18 (45%) Pneumonia, 13 (32.5%) respiratory failure, 6 (15%) ARDS

D) Morbidity: 10 (25%) ICU admitted patients and 30 (75%) non-ICU and non-invasive mechanical ventilation

E) Mortality cases were 11 (27.5%)

Table 2: Study of laboratory findings in swine flu H₁N₁ patients 6 (15%) anaemia, 12 (30%) leucopenia, 4 (10%) thrombocytopenia, 8 (20%) renal dysfunction, 2 (5%) hyperalbummenia, 8 (20%) reduced level SGPT (<45 IU).

Table-3: Comparison of H₁N₁ positive and negative patients admitted to the ICU Acute respiratory failure was observed in sexual H1N1 positive patients:

Stay at the ICU (in days) 5 to 6 days in the positive, 3 to 4 days in the negative. The duration of illness was 6 to 8 days in H1N1-positive patients and 5 to 6 days in negative patients. PH value (on admission) 7.4 ± 0.2 in H1N1 positive patients, 7.1 to 0.1 in negative patients, Fio₂ – 89 ± 50 in H1N1 positive patients, 90 ± 40 in negative patients, Pio₂ – 45 ± 14 in H1N1 positive patients, 49 ± 5 in negative patients.

Discussion

Present study of swine-origin influenza H₁N₁ virus infection in the Maharashtra population. Clinical manifestations were 38 (9.5%) cough and fever, 25 (62.5%) fever, 23 (57.5%) tachycardia and tachypnea on auscultation, 13 (32.5%) breathiness, 9 (22.5%) sore throat, 19 (47.5%) body ache, 3 (7.5%) vomiting, 5 (12.5%) diarrhoea, and 33 (82.5%) fatigue. Co-morbidities were: 8 (20%) type-II DM, 7 (17.5%) CKD, (chronic kidney disease) 3 (7.5%) immune suppression. The radiological profile was: 18 (45%) had pneumonia, 13 (32.5%) had respiratory failure, and 6 (15%) had ARDS. The morbidity included 10 (25%) patients admitted to the ICU, 30 (75%) non-ICU patients, and non-invasive and invasive mechanical ventilation, mortality cases were 11 (27.5%) (Table-1). Laboratory findings were – 6 (15%) anaemia, 12 (30%) leucopenia, 4 (10%) thrombocytopenia, 8 (20%) renal dysfunction, 2 (5%) hyperalbuminemia, and an 8 (20%) reduced level of SGPT (Table-2). In the comparative study among ICU admitted patients, there was a higher profile of PH, Fio₂, Pio₂ parameters, and even duration of illness and stay at the hospital in H1N1-positive patients admitted to the ICU ward (Table-3). These findings were more or less in agreement with previous studies [5,6,7]

Influenza IAV viruses are the pathogens with the highest impact on public and animal health, Several mechanisms, including a high mutation rate, resentment of genes, and host switching, are responsible for the genetic and antigenic evolution of IAVs [8,9].

It was reported that positivity of PCT in fatal cases, secondary bacterial pneumonia, such as Staphylococcus aureus and Streptococcus pneumonia, was observed in H1N1 viral infections [10].

In the present study, it was observed that, subsequent human to human transmission seemed to be limited, hence, for such a zoonotic infection, WHO to anticipate this in selecting the vaccine strain candidates [11]. In addition to this, biosecurity measures should include actions aimed at reducing IAV interspecies transmissions, hence use of protective mask and gloves and annual influenza vaccine to workers which deal with Pig or Pork industry.

Summary and Conclusion

Fever and breathlessness were the main complaints. Tachypnoea and tachycardia, as clinical signs, predict the development of respiratory complications in H₁N₁ swine flu. ABG and PaO₂/ FiO₂ are important in deciding the severity of lung injury and mode of ventilation. ARDS was observed to be the main cause of mortality. PCT-level estimation is also useful in determining outcomes.

Apart from this clinical management, vaccination and awareness regarding the mobility and mortality of swine flu will be quite effective in saving people from such a pandemic infection.

Limitation of the study

Owing to the tertiary location of the research centre, the small number of patients, and the lack of the latest technologies, we have limited findings and results.

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Table 1: Clinical Manifestation of H₁N₁ patients (No of patients: 40)

Sl. No	Particulars	No of patients	Percentage (%)
1 (A)	Cough and fever	38	95
2	Fever	25	62.5
3	Tachycardia and tachypnoea on Auscultation	23	57.5
4	Breathlessness	13	32.5
5	Sore throat	9	22.5
6	Body ache	19	47.5
7	Vomiting	3	7.5
8	Diarrhea	5	12.5
9	Fatigue	33	82.5
10 (B)	Morbidity		
	Type-II DM	8	20
	CKD	7	17.5
	Immune suppression	3	7.5
(C)	Radiological		
	Pneumonia	18	45
	Respiration Failure	13	32.5
	ARDS	6	15
(D)	Morbidity		
	ICU	10	25
	Non-ICU and Invasive mechanical ventilation	30	75
(E)	Mortality	11	27.5

Table 2: Study of Laboratory findings in swine flu H₁N₁ patients (No of patients 40)

Sl. No	Particulars	No of patients	Percentage (%)
1	Anemia (>10mg/dl Hb%)	6	15
2	Leucopenia (>4000/mm ³)	12	30
3	Thrombocytopenia (>1.5 lac/mm)	4	10
4	Renal dysfunction (S. creatinine>1.5mg/dl)	8	20
5	Hyper-albummenia (TSB>2.0 mg/dl)	2	5
6	SGPT(>45 IU)	8	20

Table-3 Comparison of H₁N₁ positive and negative patients ICU (8= H₁N₁positive and 2 were negative)

Variable at admission	H ₁ N ₁ positive = 8	H ₁ N ₁ negative =2
ARF during illness	6	-
Stay at ICU (in days)	5 to 6	3 to 4
Duration of illness	6 to 8 days	5 to 6days
PH on admission	7.4 ±0.2	7.1 ±0.1
FiO ₂	89±50	90±40
PaO ₂	45±14	49±5

FiO₂= Fraction of inspired oxygen

PaO₂= Partial pressure of oxygen

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