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*Original Research Article*

# H1N1 Swine Flu: The Clinico-epidemiological Surveillance in Sangli district of Western Maharashtra, India

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## ABSTRACT

**BACKGROUND:** Influenza continues to be a significant cause of morbidity and mortality globally. Genetic re-assortments in the virus can cause fast and unpredictable changes leading to recurrent epidemics of febrile respiratory disease. Surveillance is the foundation of all efforts to understand and control influenza. Effective case detection and treatment as per WHO guidelines is necessary to reduce the mortality from influenza.
**OBJECTIVES:** To find the proportion of swine flu "cases" in relation to total suspected cases in one calendar year and to study their clinico-demographic profile.
**METHODOLOGY:** A Cross-sectional study was carried out in 4 centers, identified as per Govt. guidelines for screening, diagnosis and management of H1N1 cases in 1 year period (Oct'2009 to Sept'2010). Information was collected using predesigned proforma from 100% "suspects" of Influenza A admitted to isolation wards, after duly informing the patients.
**RESULTS:** Out of total 466 "suspects", 142 (30.47%) were found to be positive. M:F ratio of cases was 1.3:1. Maximum cases (47.18%) were reported between >20 – 40 years of age group. 105 cases (73.94%) were reported from Sangli district and 94 cases (66.20%) were residing in rural area with most of them being admitted in the month Aug'2010 i.e. 229 (49.14%). Maximum deaths 25 (75%) occurred during monsoon. The most common symptom observed was cough in 107 cases (75.4%). 108 (76.06%) cases had no associated morbidity. The most common co- morbidity was diabetes with hypertension, observed in 12 cases (8.45%).
**CONCLUSION:** Early case detection can reduce the burden of disease, so the health system should be strengthened and voluntary early reporting of cases should be encouraged through

various health campaigns. Special measures should be taken during pre-monsoon season to reduce the risk of transmission.
**Key words:** Influenza, Surveillance, Western Maharashtra

## INTRODUCTION

Influenza (Flu) pandemics are caused by new influenza viruses that have recently adapted to humans and resemble major natural disasters both in terms of recurrence and magnitude. The influenza virus, known to be circulating as a pathogen in the human population since 16th century is notable for its unique ability to cause recurrent epidemics and global pandemics. Genetic re-assortments in the influenza virus cause fast and unpredictable changes leading to recurrent epidemics of febrile respiratory disease every 1 to 3 years consistently necessitated the development of new vaccines. Each century has seen some pandemics rapidly progressing to all parts of the world due to emergence of a novel virus strain (A/California/07/2009) to which the overall population holds no immunity. [1]

Influenza like Illness caused by Influenza A [H1N1], a quadruple re-assorted influenza virus, was reported from Mexico on 18th March'2009 and rapidly spread to neighboring United States and Canada. Subsequently the disease spread to all the continents. [2-4] World Health Organization [WHO] has raised the level of Influenza pandemic alert from Phase 5 to 6 on 11th June 2009. As per WHO, India has experienced the start of 2009 Influenza pandemic. The overall severity of Influenza pandemic was moderate, implying that most people recovered from infection without the need for hospitalization or the medical care. [1]

India reported its first case on 16th May 2009 in Hyderabad. Most of the cases reported subsequently were travel related cases among those traveling to India from affected countries. Substantial number of cases reported from Maharashtra (Mumbai and Pune), Karnataka (Bangalore) and Tamil Nadu (Chennai) were indigenous cases. [5] In Maharashtra, first case was reported on 19th June 2009 in Mumbai and on 10th July in Pune in a school student. As on 3rd Oct'2010, total lab confirm cases were 9895 and death of positive patients were 917.

Sangli district in Western Maharashtra experienced a strong wave of transmission in Oct'2009 and Aug'2010. [6]

The magnitude of the problem of Swine flu is ever increasing in India. The qualitatively and quantitatively effective case detection and treatment as per WHO guidelines is necessary to reduce the mortality from Influenza A H1N1 virus. The present study was carried out to find out the proportion of swine flu "cases" in relation to total suspected swine flu cases in one calendar year and also to study the clinico-demographic profile of the swine flu cases.

## MATERIALS AND METHODS

**Study Area:** The present study was carried out in four hospitals namely, Govt. Medical College Hospital, Miraj, Padmabhushan Vasantdada Patil Govt. Hospital, Sangli, Bharti Medical College Hospital, Sangli and Wanless Hospital, Miraj, identified as per Govt. guidelines for screening, diagnosis and management of H1N1 cases in Sangli district from 1st October'2009 to 30th September'2010.

**Study Design:** A descriptive cross-sectional study

**Study Sample:** It comprised of 100% "suspects" of Influenza A HINI swine flu admitted to isolation wards of all the above identified hospitals.

**Exclusion Criteria:** Patients who were brought dead by relatives & those who were non willing to participate were excluded.

**Ethical Aspects:** The approval and clearance on ethical and operational aspects from the Institutional Ethical Committee was procured prior to conduction of this study. Informed consent of the patients was obtained prior to their interviews and examination. No investigative/ diagnostic/ therapeutic interventions were made in any patient by any of the authors.

Standard case definitions were used for the categorization of influenza A patients as per clinical features. The personal interview technique combined with clinical examination was used uniformly using the pre-designed structured questionnaire. The information regarding results of investigations was taken from hospital case sheets after duly informing to the doctor-in-charge as well as the patient about the same. The data obtained was fed up in Microsoft Excel sheet and was analyzed.

## RESULTS AND DISCUSSION

**Table No.: 1 Total cases of Swine flu during the study period.**

| | |
|---|---|
| Negative | 324(69.53) |
| Positive | 142(30.47) |
| Total Suspects | 466(100.0) |
| Total contacts treated | >4044 |

(* - Figures in parenthesis represent percentages)

From Table no.: 1 , total 466 "suspects" of swine flu influenza A H1N1 infection were hospitalized from Oct' 2009 to Sept' 2010. Out of which, 142 (30.47%) were positive and 324 (69.53%) were negative for Influenza A H1N1 infection. At the same time, for more than 4044 contacts of positive cases, post exposure prophylaxis was given during this period.

**Table No.: 2 Age and Genderwise distribution of cases.**

| Age group (years) | Male (%) | Female (%) | Total (%) |
|---|---|---|---|
| 0-20 | 24(29.63) | 10(16.39) | 34(23.94) |
| >20-40 | 35(43.21) | 32(52.46) | 67(47.18) |
| >40-60 | 17(20.99) | 15(24.59) | 32(22.54) |
| >60 | 5(6.17) | 4(6.56) | 9(6.34) |
| Total | 81(57.04) | 61(42.96) | 142(100.0) |

Table No.: 2 shows M:F ratio of cases was 1.3:1. Maximum cases (47.18%) were reported between >20 – 40 years of age group. These findings were consistent with the various other similar studies done by Sabra L Klein et al (2009) [7] in USA, Mohammad A et al (2010) [8] in

Saudi Arabia. The probable reason for predilection of male sex may be due to greater mobility, susceptibility and exposure to infection and also this age group consists of economically productive mobile population, travelling more for various reasons and most susceptible to exposure to infection, so they get exposed to virus easily and get infected easily.

**Table No.: 3 Residence wise distribution of cases.**

| Residence | Sangli District | Out of Sangli District | Total |
|---|---|---|---|
| Urban | 46(43.81) | 2(5.41) | 48(33.80) |
| Rural | 59(56.19) | 35(94.59) | 94(66.20) |
| Total | 105(73.94) | 37(26.06) | 142(100.0) |

Table No.: 3 shows 105 cases (73.94%) were reported from Sangli district and 94 cases (66.20%) were residing in rural area. Out of 37 cases (26.06%) from out of Sangli district, 14 cases were from Karnataka, 19 cases were from Kolhapur, 1 case each from Solapur, Satara, Beed and Thane district. More number of cases from rural area may be due to increased referral due to increased awareness among health care personnel [9] about H1N1Influenza A infection and also lack of health care facilities to manage such cases in rural area.

**Figure 1. Sangli district Map showing area wise distribution of swine flu cases.**

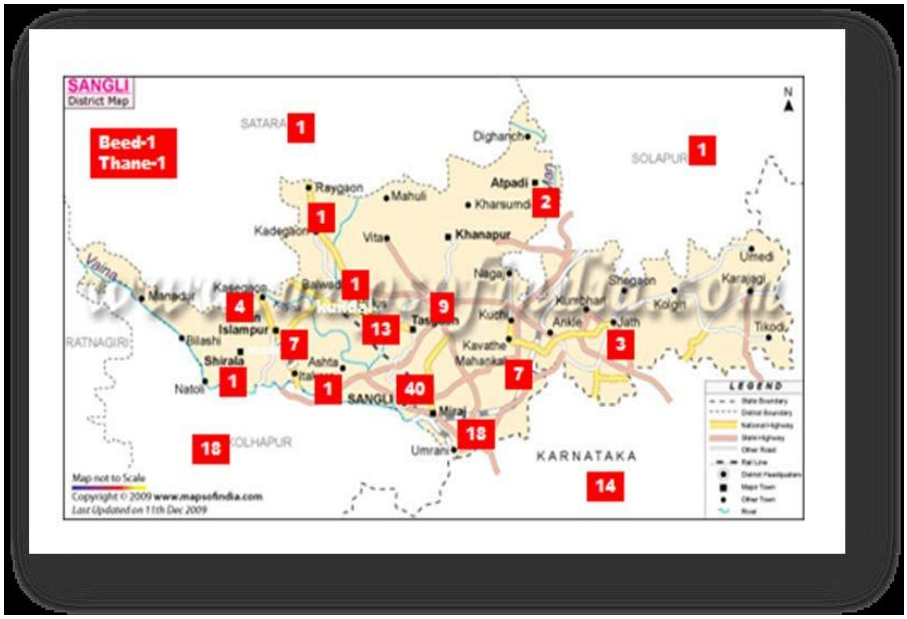

**Table No.: 4 Month wise distribution of cases.**

| Month | Total suspects (%) | Negative (%) | Positive (%) |
|---|---|---|---|
| Oct-09 | 52 (11.16) | 34 (10.49) | 18 (12.68) |
| Nov-09 | 5 (1.07) | 5 (1.54) | 0 (0.00) |
| Dec-09 | 13 (2.79) | 7 (2.16) | 6 (4.23) |
| Jan-10 | 9 (1.93) | 6 (1.85) | 3 (2.11) |
| Feb-10 | 12 (2.57) | 8 (2.47) | 4 (2.82) |
| Mar-10 | 7 (1.50) | 5 (1.54) | 2 (1.41) |
| Apr-10 | 4 (0.86) | 3 (0.93) | 1(0.70) |
| May-10 | 3 (0.64) | 3 (0.93) | 0 (0.00) |
| Jun-10 | 2 (0.43) | 2 (0.62) | 0 (0.00) |
| Jul-10 | 41 (8.80) | 23 (7.10) | 18 (12.68) |
| Aug-10 | 229 (49.14) | 156 (48.15) | 73 (51.41) |
| Sep-10 | 89 (19.10) | 72 (22.22) | 17 (11.98) |
| Total | 466 (100.0) | 324 (100.0) | 142 (100.0) |

It was observed from Table No.: 4, that most of the suspected cases were admitted in the month August'2010 i.e. 229 (49.14%), followed by September - 89 (19.10%), October - 52 (11.16%) and July - 41(8.80%). Least number of cases i.e. 2 (0.43%) were admitted in the month of June'2010.

**Table No.: 5 Season wise distribution of cases.**

| Season | Cured (%) | Deaths (%) | Total (%) |
|---|---|---|---|
| Monsoon | 81(76.42) | 27(75.0) | 108(76.06) |
| Winter | 22(20.75) | 5(13.89) | 27(19.01) |
| Summer | 3(2.83) | 4(11.11) | 7(4.93) |
| Total | 106(74.64) | 36(25.36) | 142(100.0) |

Table No.: 5 shows; Among the total positive cases, 106 cases (74.64%) recovered and discharged, while 36 cases (25.36%) died due to Influenza A H1N1 infection.108 cases (76.06%) were reported in the monsoon season. Similarly, maximum deaths 25 (75%) occurred during monsoon.

**Table No.: 6 Distribution of cases according to symptoms* (n=142)**

| Symptoms | Cured (%) (n=106) | Deaths (%) (n=36) | Total (%) (n=142) |
|---|---|---|---|
| Cough | 73(68.87) | 34(94.44) | 107(75.4) |
| High grade fever | 64(60.38) | 24(66.67) | 88(62.0) |
| Running nose | 60(56.60) | 5(13.89) | 65(45.8) |
| Headache & Bodyache | 30(28.30) | 35(97.22) | 65(45.8) |
| Mild fever | 20(18.87) | 29(80.56) | 49(34.5) |
| Sore throat | 34(32.10) | 13(36.11) | 47(33.1) |
| Breathlessness | 0(0.00) | 34(94.44) | 34(23.9) |
| Vomiting | 10(9.43) | 11(30.56) | 21(14.8) |
| Chest pain | 0(0.00) | 2(5.56) | 2(1.4) |
| Diarrhoea | 0(0.00) | 1(2.78) | 1(0.7) |

(* Multiple responses)

From Table No.: 6, the most common symptoms observed in H1N1cases were cough in 107 cases (75.4%) followed by high grade fever in 88 cases (62%), running nose in 65 cases (45.8%), headache & bodyache in 65 cases (45.8%), mild fever in 49 cases (34.5%), sore throat in 47 cases (33.1%) and breathlessness in 34 cases (23.9%) cases. Other rare symptoms were vomiting in 21 cases (14.8%), chest pain in 2 cases (1.4%) and diarrhoea in 1 case (0.7%).

It was observed that cough (68.89%), high grade fever (60.38%), running nose (56.60%) & sore throat (32.10%) were the few commonly observed symptoms in patients of swine flu who were cured while headache & bodyache (97.22%), cough (94.44%), breathlessness (94.44%), mild fever (80.56%) & high grade fever (66.67%) were the few commonly observed symptoms in swine flu cases who died showing that 1 or more symptom/s of Lower respiratory tract (LRTI) involvement had poor outcome.

M Moghadami et al (2010) [10] at Southern Iran in their study observed that fever (85.3%), cough (58.3%), sore throat (57.1%) and myalgia (48%) were presenting symptoms those who cured. These findings were found comparable with this study.

Seema Jain et al (2009) [11] in United States in their study observed that fever (95%), cough (93%), rhinorrhea (32%), sore throat (31%), vomiting (26%) and diarrhea (25%) in their study group those who cured.

**Table No.: 7 Distribution of cases according to associated morbidities.**

| Type of Morbidity | Cured (%) (n=106) | Deaths (%) (n=36) | Total (%) (n=142) |
|---|---|---|---|
| DM & HT | 6(5.66) | 6(16.67) | 12(8.45) |
| Cardiovascular Disorders | 5(4.72) | 2 (5.56) | 7(4.93) |
| Diabetes mellitus | 4(3.77) | 0(0.00) | 4(2.82) |
| Respiratory disorders | 1(0.94) | 3(8.33) | 4(2.82) |
| Endocrine disorders | 0(0.00) | 3(8.33) | 3(2.11) |
| HIV & AIDS | 0(0.00) | 1(2.78) | 1(0.70) |
| Pregnancy* | 0(0.00) | 3(8.33) | 3(2.11) |
| Total | 16(15.09) | 18(50.0) | 34(23.94) |
| Not Associated with Morbidity | 90(84.91) | 18(50.0) | 108(76.06) |
| Total | 106(100.0) | 36(100.0) | 142(100.0) |

(* Pregnancy – Even though it is a physiological condition, but as it increases the morbidity and mortality in the cases of H1N1 so it is included in the list).

Table No.: 7 shows, that 108(76.06%) cases had no associated morbidity. It was found that among morbidities, diabetes with hypertension was observed in 12 cases (8.45%) followed by cardiovascular disorders in 7 cases ( 4.93%), respiratory disorders in 4 cases (2.82%) , diabetes mellitus in 4 cases (2.82%), endocrine disorders in 3 cases ( 2.11%), HIV & AIDS in 1 case (0.7%) and pregnancy in 3 cases (2.11%).

Seema Jain et al (2009) [11] at United States in their study also observed that asthma (27%), diabetes (25%), chronic cardiovascular disease (20%), pregnancy (11%) were the associated morbidities in their study group. Alejandro Rodriguez et al (2010) [12] at Spain in their study observed that diabetes mellitus (10.9%), cardiovascular disease (7.6%), respiratory diseases (7.6%), pregnancy (5.7%), hematological disease (5.7%), HIV & AIDS (2%), were the associated morbidities present in those who died due to H1N1.

## CONCLUSION

The present study revealed that proportion of swine flu positive cases were higher in 20-40 years of age group, with maximum being reported from Sangli district and from rural area. Monsoon season was associated with maximum number of cases. Cases with Upper Respiratory Tract (URTI) symptoms had good outcome and got cured but cases with Lower Respiratory Tract (LRTI) symptoms had poor outcome. The risk of death was seen more in cases with associated co-morbidities.

## RECOMMENDATIONS

1. Early detection of cases can reduce the burden of disease, so the health system should be strengthened to detect the suspected cases in early stage of disease.

Voluntary early reporting of cases should be encouraged through various health campaigns.

2. As there is a risk of cases in monsoon season, special measures should be taken during "pre-monsoon season" in the community.

3. "High alert" should be declared during monsoon season for community as well for Health system.

4. As the large numbers of cases were reported from rural area, primary health care infrastructure should be strengthened.

5. Referral system from primary- secondary- tertiary care should be strengthened.

6. Health education and preventive measures can reduce the disease transmission and overall disease burden in community.

## LIMITATIONS

1. As this is the hospital based study, the generalization of prevalence rates on the basis of present study is not possible nor representativeness of the sample can be commented.

2. Hospital sample has tendency to result "Spurious association" which cannot be ignored.

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