

An epidemiological investigation of influenza like illness (ILI) to confirm the A H1N1 among patients admitted to secondary and tertiary care hospital of Nagpur, central India

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Abstract- Introduction: In April 2009, a new strain of Influenza virus A H1N1, commonly referred to as "swine flu," began to spread in several countries around the world. Maharashtra state, including the Nagpur region, also started monitoring and surveillance activities as soon as the positive cases were first reported in August. We investigated these cases of influenza like illness (ILI) to confirm the A H1N1 among patients admitted in a tertiary care hospital.

Methods: The present study was a cross-sectional study of successive, suspected and confirmed H1N1 patients with respiratory complication admitted to swine flue ward and ICU of a tertiary care centre from January to December 2012 at Government Medical College and Hospital, Nagpur. All cases were RT-PCR confirmed at National Institute of Virology, Pune, Maharashtra.

Results: A total of 22 (22.22%) samples from 99 patients were confirmed influenza A (H1N1) positive. None of the patients had a history of foreign travel. Overall, 13.13% of the patients came in contact with ILI in the family in last 2 weeks. Cases of A H1N1 reported throughout the year, however; there is sudden increase in number 66 (66.66%) of ILI in the month of September with A(H1N1) positivity rate (19.7%), later on AH1N1 positivity increased in the month of October (33.3%) and November (42.9%). Confirmed Cases of A (H1N1) transmission activity has increased since September 2012. In this study only 21.21% of patients with ILI reported within 24 hours. Among 22 confirmed positive cases, 5 died yield a case fatality rate of 22.72%.

Conclusion: It can be concluded that the prevalence of Influenza A (H1N1) is high in the month of September month among middle aged population in central India. This investigation provides hospital-based epidemiological information to arrive at a more precise and accurate understanding of Influenza A (H1N1).

Index Terms- A (H1N1), ILI, Influenza, Swine flue, tertiary care hospital, central India

I. INTRODUCTION

In April 2009, a new strain of Influenza virus A H1N1, commonly referred to as "swine flu," began to spread in several countries around the world. In India, this pandemic started from August 2009, with index case reported from Pune, and this epidemic spread to other parts of the country quickly [1]. Influenza virus is a common human pathogen that has caused serious respiratory illness and death over the past century. It always had potential to cause widespread pandemics whenever a new type of Influenza strain appeared in the human population and then spread easily from person to person [2]. In one of the tertiary care hospital of Nagpur reported 27.0% positivity of AH1N1 among patients who were admitted for ILI from August 2009 to April 2011. It was associated with seasonal variations [3, 4]

The Ministry of Health and Family Welfare, Government of India [5], started preparations regarding the management of infected patients as soon as the first case of 2009 pandemic H1N1 influenza was reported. Maharashtra state, including the Nagpur region, also started monitoring and surveillance activities as soon as the positive cases were first reported in August. Government Medical College and Hospital (GMCH), Nagpur is a Nodal Surveillance Centre for A H1N1. Most cases of H1N1 influenza infection present as mild or subclinical pneumonia, but some present as severe community acquired pneumonia (CAP) and require admission to intensive care unit (ICU) usually [6]. With this background, we investigated cases of influenza like illness (ILI) admitted in the year 2012 and assess the epidemiology of A H1N1 in a tertiary care hospital.

II. MATERIAL AND METHODS

The present study was a cross-sectional investigation of successive, suspected and confirmed H1N1 patients with respiratory complication admitted to swine flue ward and ICU of a tertiary care centre from January to December 2012. All cases were RT-PCR confirmed at National Institute of Virology (NIV), Pune, Maharashtra.

Laboratory confirmation of infection-A (H1N1) influenza virus was made with the use of RT-PCR assay in accordance with the protocol from the US Centers for Disease Control and Prevention, as recommended by the WHO [7]. Persons suspected of being infected were investigated by taking two nasopharyngeal swabs for detection of the virus by RT-PCR assay.

The Ministry of Health and Family Welfare, Government of India, started preparations regarding the management of infected patients as soon as the first case pandemic H1N1 influenza was reported in May 2009. Maharashtra state, including the Nagpur region, also started monitoring and surveillance activities as soon as the positive cases were first reported in August 2009. Nagpur city, the centre of India economic hub of the Vidarbha region, has several hospitals providing intensive care, including the Medical Colleges, Corporation Hospital and private hospitals. Majority of suspected patients were referred to Nodal Centre, Government Medical College and Hospital (GMCH), Nagpur which has all advanced life-saving support system in place. All of suspected H1N1 were managed at respective places; however their samples for confirmation were send to NIV, Pune through this Nodal centre at GMCH. Following the death of one confirmed case of H1N1 infection, the Government of Maharashtra made it mandatory to refer all ILI cases from private hospitals, medical college hospitals to Nodal Center, GMCH, Nagpur for laboratory confirmation. Immediately after admission of ILI case in swine flue ward or other secondary health care, this information was provided to established surveillance system. Accordingly rapid response team visited to place of admission and database was generated. Tracking of all confirmed cases of A (H1N1) was done by surveillance team at GMCH.

From January to December 2012, a total of 99 patients were admitted in different hospitals in Nagpur with influenza-like illness (ILI). They were tested for influenza A (H1N1) and included for analysis. Data collection: A team of health workers collected information from all the cases of ILI about the demographic details, residence, date of onset of illness, clinical details, results of laboratory investigations, history of travel within and outside the country and history of contact with positive case of influenza (H1N1). Patients with ILI were encouraged to get admission in the swine flu ward of study hospital for treatment. Patients (or their relatives) admitted in other nursing homes were also contacted using the addresses provided by them at the time of laboratory testing.

Categorization of Influenza A(H1N1) case [8].

The Ministry of Health and Family Welfare, Government of India, issued guidelines for the categorization of influenza A(H1N1) cases during screening for home isolation, testing, treatment, and hospitalization.

III. CLINICAL CASE /SUSPECTED CASE DEFINITION

A suspected case was defined as an ILIs with a temperature of $>37.5^{\circ}\text{C}$ and at least one of the following symptoms: sore throat, cough, rhinorrhea, or nasal congestion, and either a history of travel to a country where infection had been reported in the previous seven days or an epidemiologic link to a person with confirmed or suspected infection in the previous seven days. A confirmed case was defined by a positive result of a real-time

reverse transcriptase polymerase chain reaction (RT-PCR) assay performed at a laboratory operated under the auspices of the state government.

Standard clinical criteria was used to suspect and diagnose H1N1 and other related clinical conditions [WHO. The demographic, clinical, laboratory and radiological data were collected during the course of illness and analyzed]. All cases were treated with oral oseltamivir 75 mg bid, from the day of admission, in accordance with the WHO criteria [9].

All the patients were treated with broad spectrum antibiotics to cover co-infection/secondary bacterial infections and inotropic support for shock and ventilatory support given according to patient requirement. Approval by the institutional ethics committee was not required because this infectious disease fell under the jurisdiction of the Epidemic Disease Control Act (1897), which allows the collection of data on emerging pathogens when it is of public health interest, and was invoked by the state health department in August 2009 [10].

Statistical analysis: Categorical data like gender, morbidities, normal and abnormal laboratory values, and outcome were analyzed and presented as frequency and percentages. Quantitative data like age, was presented as SD with 95% CI, and median age with range. Chi Square test was applied to test association between clinical outcomes and categorical variables. The statistical test was considered significant at $P < 0.05$.

IV. RESULTS

A total of 99 patients with suspected influenza A H1N1 were evaluated during the study period. Between first January and December 2012, a total of 99 patients were admitted to swine flu ward of GMCH, Nagpur and other secondary and tertiary care hospitals of Nagpur. Of them, 99 (100%) had symptoms of ILI and their swabs were sent to laboratory investigations. Out of total 99 ILI cases, majority 66 (66.66%) of them were reported in the month of September alone. A small peaks of ILI were also reported in the month of April (9.09%) and December (7.07%). So far as mortality is concern Influenza A (H1N1) virus infections was confirmed in 22 (22.22%) patients and 5 (5.1%) deaths were reported (Table 1, Figure 1). Influenza A (H1N1) positives were reported in the month of February, March, April, September, October, and November. Out of total 22 positive cases, 13 (59.0%) cases were reported in the month of September alone [Figure 2]. Out of 66 ILI, 13(19.7%) were confirmed cases of A (H1N1) were also reported in the month of September. It also reveals that out of 13 reported cases, 2 (15.38%) deaths were reported in the month of September but out of 7 ILI cases; 3 (42.9%) were positive of A(H1N1) and also 2 (66.66%) deaths were reported in the month of November. In spite of more confirmed A(H1N1) confirmed cases in the month of September, mortality in the month was only (15.38%) however, in the month of November mortality due to A H1N1 was (66.66%).

Table 2 shows that no confirmed case of H1N1 was reported in age group less than 14 years of age. Out of 32 cases of ILI in the age group 35-49 years; 8(25.0%) were confirmed for A (H1N1), out of 14 in the age group 50-60 years, 5 (35.7%) were H1N1 positive. However, in the other age groups proportion of

positivity ranges from 16.0% to 35% over all the age groups. However, no significant trend was observed ($P>0.05$).

Out of 50 suspected males 13 (26.0%) and out of 49 females, 9 (18.36%) were H1N1 positive. This difference by gender was also not found to be statistically significant ($P>0.05$). More number of cases 15 (29.41%) of H1N1 were reported from urban residence as comparative to 7 (14.58%) cases reported from rural areas. This difference was not found to be statistically significant ($P>0.076$). Among 22 confirmed positive cases, 5 died yield a case fatality rate of 22.72%.

Table 3 shows: commonly prevalent symptoms associated with Influenza A H1N1 these were found to be : fever (100%), cough (79.80%), breathlessness in 82.83%, sore throat (24.24%), the most common presentations among ILI cases were fever and cold-like features, but not cough (21.20%); fever with shortness of breath with or without cold-like features (18.17%); fever with cold-like features (56.57%) and features of body ache, head ache were also reported in 31.31% and 44.44% respectively. Diarrhoea and vomiting was reported in (6.0%) and 4.04% respectively. Among the 99 cases of ILI, 13.13% had history of ILI in the family during last 2 weeks. Only 21.21% of the ILI cases reported to the nodal centre GMCH within 24 hours of illness.

V. DISCUSSION

All 99 ILI cases from January 2012 to December 2012 reporting to the Influenza A H1N1 nodal screening center, swine flue ward and emergency department were included in this study. GMCH had cases from almost all districts of Vidarbha, Maharashtra, and near by Madhya Pradesh state, which may reflect the trend, morbidity and mortality of Influenza A H1N1 in this central part of India. Of these 99 ILI, influenza A (H1N1) virus infections was confirmed in 22 (22.22%) patients and 5 (5.1%) deaths were reported. A case fatality rate was reported to be 22.72%.

As of January 2010, in India, 134,116 persons had been tested for Influenza A H1N1 and 30,581 (22.80%) of them had been found to be positive, with a case fatality ratio of 4.9% (1501) [11]. While the positivity rate in this study is 22.22%, with a case fatality ratio of 22.72%. High prevalence and mortality may be attributed to the study population restricted to a small geographical area when compared against the entire country and sick patients referred from adjacent states having delay in essential medical care required, with loss of crucial time.

Age of ILI patient varied from 13 years to 76 years, with an average age (SD) of 38.39 (17.03) years. Mean age (SD) of A H1N1 male was 35.07 (12.45) years and in female it was significantly higher 39.66 (17.56) years. No A H1N1 positive case was reported in less than 14 years; however, positivity rate of A H1N1 was not significantly different than other age group. No mortality was reported in the age group less than 22 years. Of the total 22 cases, median age of infected women was 35 years (range Min 22-Max 76) and in male it was 35 years (Min18-Maxi 56).

Out of total 5 deaths; 3 (60%) of mortality was observed in patients age group 23- 40 years of age, In this study H1N1 positivity rate ranges from 16-35% in the age group more than 15 years of age. A study (2009-2011) from Nagpur [3] shows that

15% of the AH1N1 belongs to less than 15 years of age group. Srikhande et al reported positivity rate 44 (65.67%) in male and 23 (34.32%) in female; however in the present study 13.1 % and 9.1% of males and female respectively reported to be positive. In the present study a total of 49.25% ($n = 33$) cases of ILI had associated medical ailments. In the present study Anemia and diabetes (8.95%) were the most common medical ailments associated with H1N1, followed by bronchial asthma (7.46%).

None of the patients had a history of foreign travel, whereas 13.13% of the patients gave history of ILI in the family in last two weeks. However, in another study from Nagpur [3] shows, 22.38% of the patients came in contact with proven cases of pandemic H1N1. According to a study, the prevalence of Influenza A (H1N1) in 2009 was greatest among children and young adults, although older patients and those with co-morbidities are more likely to experience worse clinical outcome [12]. Similarly, a study done in New Zealand concluded that, in 2009, Influenza A H1N1 predominantly affected young women with relative sparing of the elderly population [13]. According to a study done in Queensland, a large number of cases were reported in the 10-19 years age group (28%), followed by the 20-29 years age group (26%) [14].

Although the classical season of influenza is in winter, the peak of the cases reported in the month of September, October and November, which coincided with the rainy season at our study site. Earlier study [3] reported maximum cases in two months of August and September 2009-2011, which reported the largest block on cases, also witnessed the progressions of the rainy season and a high amount of relative humidity in the air. No cases of H1N1 were reported in October, which also witnessed a sharp fall in the amount of rain received locally in the region.

The most common symptoms with which patients presented were fever (100%), cough (79.80%), sore throat and nasal discharge (48.48%) and difficulty in breathing (28.28%). These findings are consistent with Kolkata study [15]. In a study done in mainland China, fever (81%), cough (40%) and sore throat (35%) were found to be most common symptoms in Influenza A H1N1 [15,16,17]. Fever (56%) was also reported to be the most common symptom, followed by cough (54%), sore throat (32%), rhinitis (17%) and difficulty in breathing (7%) in a study of the first 100 cases of Influenza A H1N1 in Saudi Arabia [18]. In a study conducted at Chile, fever was the most common presentation (83%), followed by cough (72%), odynopahgia (54%), myalgia (48%) and dehydration (4%) [19]. A study done in Japan described fever (87%) as the most common symptom, followed by cough (86.3%) and sore throat (65%) [20].

Although patients in this study comprised a sizeable proportion of ILI cases and less number of confirmed cases of AH1N1 from Nagpur and the adjoining state, the findings of this study need to be carefully extrapolated and cannot be generalized to a large population. GMCH received patients from all districts of Vidarbha, Maharashtra. However, 5 ILI and 2 A (H1N1) cases were from nearby Madhya Pradesh state.

This is one of the limitations of our study. Secondly, we restricted our study to only hospital; therefore, many cases of Influenza A H1N1 may have been missed. Not being a community-based study, we may not be able to calculate the exact measures of epidemiology. Thirdly, regional geographical

conditions have not been accounted for, which may have a significant impact on prevalence and morbidity. There may be a small number of cases that may have been missed out, although every attempt was taken to include all the cases, but this figure would not have been significant.

On the basis of the findings of this study, it can be concluded that the prevalence of Influenza A (H1N1) is high in the month of September month among middle aged population in central India. Fever, cough and sore throat are the most common symptoms with which the patients usually present to the nodal centre. This investigation provides hospital-based epidemiological information, but community-based wider studies are required to arrive at a more precise and accurate understanding of Influenza A H1N1 by epidemiological principles of time, place and person (TPP).

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Table 1. Month wise distribute of Number of cases screened, Number of cases tested positive and Number of deaths among positives during the year 2012 in Vidarbha Region.

| Month | No. screened | H1N1 Positive | | Deaths | |
|--------------|--------------|------------------------------|---------------|-----------------------------|----------------|
| | | No. positive (Percentage) | | No. deaths. (Percentage) | |
| Jan | 3 | 0 | (0.0) | 0.0 | (0.0) |
| Feb | 2 | 1 | (50.0) | 0.0 | (0.0) |
| Mar | 1 | 1 | (100.0) | 0.0 | (0.0) |
| Apr | 9 | 3 | (33.3) | 1.0 | (33.33) |
| May | 2 | 0 | (0.0) | 0.0 | (0.0) |
| Jun | 0 | 0 | (0.0) | 0.0 | (0.0) |
| Jul | 2 | 0 | (0.0) | 0.0 | (0.0) |
| Aug | 2 | 0 | (0.0) | 0.0 | (0.0) |
| Sep | 66 | 13 | (19.7) | 2.0 | (15.38) |
| Oct | 3 | 1 | (33.3) | 0.0 | (0.0) |
| Nov | 7 | 3 | 4(2.9) | 2.0 | (66.66) |
| Dec | 2 | 0 | (0.0) | 0.0 | (0.0) |
| Total | 99 | 22 | (22.2) | 5.0 | (22.72) |

Table 2. Proportion of influenza like illness (ILI) and confirmed cases of H1N1 by age group and gender.

| Age in years | Suspected cases | | Laboratory confirmed H1N1 cases | |
|------------------|-----------------|--------------|---------------------------------|--------------|
| | No | (Percentage) | No | (Percentage) |
| <14 | 3 | (3.0) | 0 | (0.0) |
| 15-24 | 25 | (25.3) | 4 | (16.0) |
| 25-34 | 15 | (15.2) | 3 | (20.0) |
| 35-49 | 32 | (32.3) | 8 | (25.0) |
| 50-60 | 14 | (14.1) | 5 | (35.7) |
| >60 | 10 | (10.1) | 2 | (20.0) |
| Gender | | | | |
| Male | 50 | (50.5) | 13 | (26.0) |
| Female | 49 | (49.5) | 9 | (18.36) |
| Residence | | | | |
| Urban | 51 | | 15 | (29.4) |
| Rural | 48 | | 7 | (14.58) |

NS- P>0.05

Table 3. Clinical presentation among ILI and Epidemiological characteristics. (n=99)

| symptoms | No | Percentage |
|--|-----------|-------------------|
| Fever | 99 | 100 |
| Fever with Chills | 56 | 56.57 |
| Nasal discharge | 48 | 48.48 |
| Soar throat | 24 | 24.24 |
| Cough | 79 | 79.80 |
| Breathlessness | 82 | 82.83 |
| Expectoration | 28 | 28.28 |
| Headache | 31 | 31.31 |
| Body ache | 44 | 44.44 |
| Fatigue | 43 | 43.43 |
| Vomiting | 4 | 4.04 |
| Diarrhoea | 6 | 6.06 |
| Epidemiological characteristics | | |
| ILI in family in last 2 weeks | 13 | 13.13 |
| Reporting <24 Hours | 21 | 21.21 |
| Reporting >24Hours | 83 | 83.84 |