

Original Article



Epidemiology and Clinical Outcome of H1N1 in Gujarat from July 2009 to March 2010

Himanshu Rana*, Pathik Parikh**, Asha N Shah***, Sanjay Gandhi†

Abstract

Objective : Epidemiology and clinical outcome of H1N1 in Gujarat from July 2009 to March 2010.

Methods and Materials: This retrospective descriptive study analyses the month wise distribution of suspected as well as confirmed cases of H1N1 with their outcomes in the state of Gujarat from the month of July 2009 to March 4th 2010. The study included only those who were falling in Category C according to the national guidelines. Besides the government hospitals, the data also have been sought from all the private hospitals suspecting and treating swine flu cases. The patients are classified according to age, gender, location, approach to either government or private hospital, duration of symptoms on admission, associated co morbid conditions, the final outcome, duration of death after symptoms and the district wise distribution of sale of Oseltamivir. The incidence ratio for cases and deaths per 10 lakh population is calculated and compared with other states.

Results : 28760 patients attended the swine flu ward and the OPD. Out of 5532 suspected severe (Category C) cases, 1486 cases were confirmed positive with positivity ratio of 26.8%. 28% of all suspected and 37.9% of all positive were seen during the month of January. 64.9% cases were seen amongst the young age group of 13 to 45 years. 55.6% cases were seen in men and maximum cases (336) and deaths (54) were seen in Ahmedabad district. Oseltamivir was started after 5 days in 52% of cases. 297 had expired with an overall Case Fatality Rate of 19.9%. Maximum deaths were seen in young age group (13-45 years) with case fatality rate of 19.6%. 41% patients succumbing to disease were referred from Private to government hospitals and overall 35% cases had expired between 1 and 24 hour of admission. 69% patients did not have history of comorbid illness/condition. Gujarat ranked 5th in Case Incidence Rate per 10 lakh population while ranked second in Death Rate per 10 lakh population.

Conclusion : The incidence and mortality from H1N1 in the state was significantly higher in young, more during the winter months. The case fatality rate in Gujarat is higher than rest of the world, the reason being a selection bias created by the categorization of the patients into category A, B and C as only category C patients were admitted and observed. The sale of Oseltamivir after liberalization of sale of the drug has greatly increased.

Introduction

H1N1 is a novel strain of Influenza A virus that evolved recently by genetic reassortment. Right from the time of the first case detection in Mexico, the disease had a rapid spread throughout the world, involving various parts of India. WHO declared H1N1 as a pandemic on 11th June, 2009. The first case was seen in Gujarat on 6th of July 2009. Like any other infectious disease occurring anywhere around the world, H1N1 Flu had a specific epidemiological trend of rise and fall in Gujarat state. This study is aimed to give an idea regarding the epidemiological trends of the disease as well as the treatment outcomes of H1N1 in the state of Gujarat

Methods and Materials

In this retrospective study we have studied the patients suspected as well as confirmed cases of swine flu in the entire state of Gujarat from month of July 2009 to March 4th 2010. A complete data of all the patients visiting these OPDs and swine Flu wards had been kept on the daily basis right from the month of July. Each and every patient visiting either swine flu OPD or swine flu ward, who was suspected clinically to be H1N1 positive were categorized in three categories according to the guidelines provided by Ministry of Health and Family welfare in August, 2009. They were as follows:

Category A Mild fever plus cough / sore throat with or without body ache, headache, diarrhea and vomiting. No testing for H1N1 is required in such patients

Category B i. Above signs and symptoms plus high grade fever and severe sore throat
ii. Addition of above symptoms and signs plus one or more of the following conditions:

- Children less than 5 years
- Pregnant women
- Age above 65 years
- Having lung, heart, liver or kidney diseases, blood disorders, diabetes, neurological disorders, cancer and HIV
- Long term cortisone

Category C In addition to symptoms and signs of A and B if patients have one or more of the following:

- Breathlessness, chest pain, drowsiness, low BP, sputum mixed with blood, bluish discoloration
- Irritability among small children, refusal to accept feeds
- Worsening of underlying chronic conditions

Those falling in category C, as per the guidelines are confirmed by the viral isolation (Polymerase chain reaction, QIAGEN™) in WHO reference laboratory by using throat and nasopharyngeal swabs are included in our study. Only those patients who fell in category C were subjected to viral isolation tests, while category B and Category A individuals were empirically given Oseltamivir and Azithromycin respectively, and are not included in the study. The patients are then classified according to age, gender, location, approach to either government or private hospital, duration of symptoms on admission, associated co morbid conditions, the final outcome, duration of death after symptoms and the district wise distribution of sale of Oseltamivir. The incidence ratio for cases and deaths per 10 lakh population is calculated and compared with other states.

Results

The total number of patients who had attended the swine flu OPD and wards were 28760. Out of these, 14699 and 8529 belonged to category B and A respectively. The individuals, who were falling in category C, were 5532. Out of all those suspected the individuals who turned out positive were 1486 while 4046 turned out negative. The case positivity ratio was 26.8%. The number of individuals suspected as well as confirmed to be H1N1 peaked during the months of December to February with

*Associate Professor, Medicine Dept, GMERS Medical College, Gotri, Vadodara; **Resident, General Medicine, ***Professor and Head, Department of Medicine, Civil Hospital, D/4 Civil Hospital, Asarwa, Ahmedabad -16; †Director of Epidemiology, Government of Gujarat, D/4 Civil Hospital, Asarwa, Ahmedabad -16

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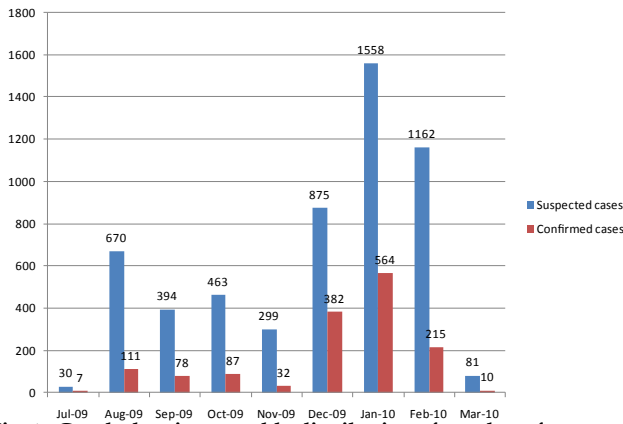


Fig. 1 : Graph showing monthly distribution of number of suspected as well as confirmed cases of H1N1 from the month of July to 4th March. (Y axis: No. of Cases, X axis: Months, July 2009 to March 2010)

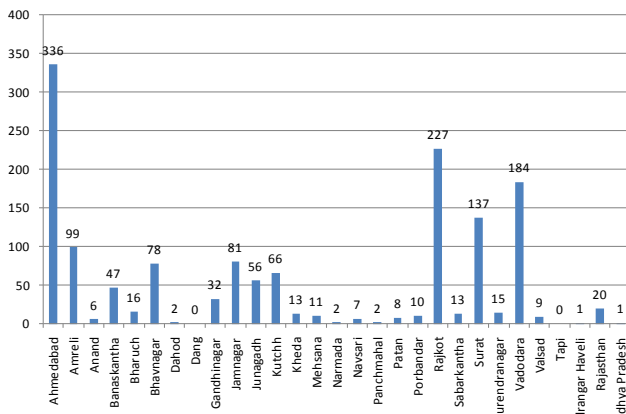


Fig. 2 : Graph showing district wise distribution of confirmed cases of H1N1 from July 2009 to March 4th 2010 in the state of Gujarat. (It also includes patient coming from states or Rajasthan and Madhya Pradesh) maximum number of suspected and confirmed cases during January where 1558 (28% of all suspected) were suspected and of them 564 (37.9% of all positive) were tested positive (Figure 1). The maximum case positivity was seen during the month of December, where 43.6% of all suspected turned out positive. 965 (64.9%) cases were seen amongst the young age group of 13 to 45 years. While 257 (17.3%) and 264 (17.8%) cases were seen in age group of less than or equal to 12 years and greater than 45 years respectively. 827 (55.6%) cases were seen in males. The maximum number of cases were seen in Ahmedabad (336) while Rajkot and Vadodara having 227 and 184 cases respectively (Figure 2). Oseltamivir was started in 52% of the patients after 5 days of symptoms, while it was given to 31% of cases between day 3 and 5 and 7% of cases between day 1 and 2. Only 7% received Oseltamivir within 1 day of onset of symptoms while it was not given to 3% cases.

Out of 1486 total positive cases 297 had expired with an overall Case Fatality Rate of 19.9%. Overall, the maximum deaths were seen in January. 119 out of 564 had expired with a case fatality rate of 21.0% during that month. There were 54 deaths in Ahmedabad, whereas Rajkot, Surat and Vadodara had 51, 24 and 23 deaths respectively. Cases coming from Rajasthan and Madhya Pradesh had 9 and 1 deaths respectively. Maximum deaths were seen in young age group (13-45 years) with 190 out of 965 (case fatality rate = 19.6%) succumbing to the disease. The case fatality rate in children less than or equal to 12 years and elderly above 45 years is 14.0% and 26.8% respectively. 63.9% of all deaths were seen in age group of 13 to 45 years. The number of men and women succumbing to the disease are 142 (17.1%) and 155 (23.5%) respectively. 41% of expired patients, were such patients who had initially taken treatment from private hospitals for swine flu and then referred to government hospitals

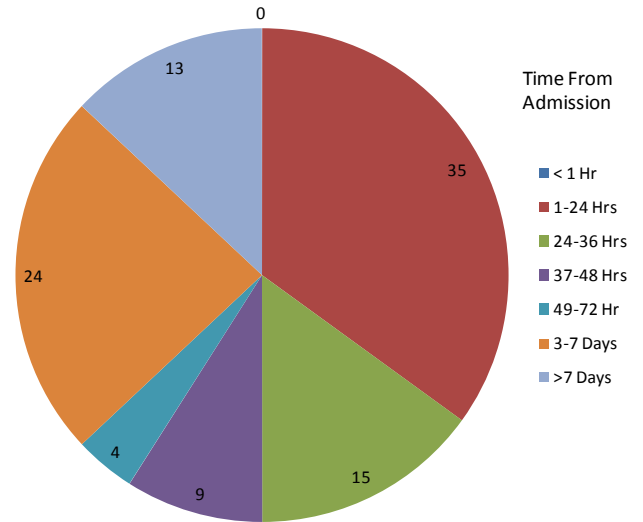


Fig. 3 : Pie diagram showing the time of death of patients from the time of admission succumbing to H1N1 from July 2009 to March 4th 2010 in Gujarat while 30%, 15% and 12% deaths were seen in Government (excluding the referred patients), private and Municipal hospitals respectively. Most of the patients who eventually succumbed to the disease, succumbed within 1 to 24 hours of admission (35%) (Figure 3). 69% of cases who expired did not have any comorbid illness (Figure 4).

The Incidence Rate (IR) of H1N1 cases in Gujarat per population of 10 lakhs is 30.14, while highest is in Delhi with an IR of 717.67/10 lakh population. Gujarat state stands 5th in Case Incidence Rate per 10 lakh population, behind Delhi, Maharashtra, Rajasthan and Karnataka. But the state wise Death Incidence Rate per 10 lakh population is 6.02, which is second only to Delhi (7.04).

Oseltamivir sale has been continuously rising in all districts in 2010 as compared to the last 6 weeks of 2009. The total sale of Oseltamivir during last six weeks of 2009 was 29612 capsules, while during first six weeks of 2010 it had risen to 86268 capsules showing a sharp rise in sale of Oseltamivir capsules in first six weeks of 2010 in Gujarat.

Discussion

Pandemic H1N1/09 virus is a Novel strain of influenza A which derived originally from a strain that lived in pigs.¹ Movement of live pigs between Eurasia and North America seems to have facilitated the mixing of diverse swine influenza viruses, leading to the multiple re assortment events associated with the genesis of the (new H1N1) strain. Virus first evolved around September 2008 and circulated in the human population for several months before the first cases were identified and the outbreak was first detected in Mexico City on March 18, 2009.² The virus spread in such a manner that on June 11, 2009, WHO declared a Pandemic Alert Level of six.³ As of June 17 most countries within the European Union had documented in-country transmission.^{4,6} The first case to be seen in India was on Saturday, May 16 when a 23 year old passenger who arrived at Hyderabad from US was detected H1N1 Positive. The first case in Gujarat was seen much later when a Thai national turned out positive on July 6 2009, Saturday in Ahmedabad.⁷ From that date onwards there is steep rise in the cases as well as mortality in the state.

Incidence

Swine Flu has affected 213 countries. Of more than 7 lakh cases seen throughout the world, India has got 29762 confirmed cases (129283 suspected) till 4th March 2010. Gujarat had 5532 suspected cases with 1486 cases turning out positive suggesting that India made only a small contribution to the overall case burden of the world. Gujarat with 1486 confirmed cases had 5% of total cases seen in India. State wise case incidence ratio per

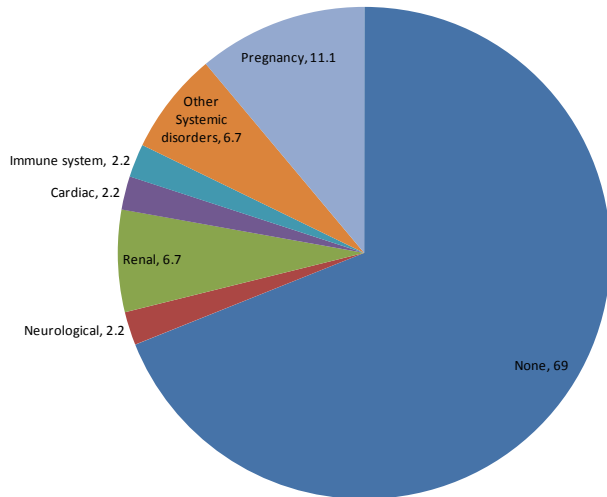


Fig. 4 : Pie Diagram showing the percentage of patients having associated disease/conditions among total H1N1 deaths in Gujarat. 10 lakh population (IR/10 lakh population) was calculated and Gujarat (30.14) was fifth among all Indian states behind Delhi (717.67), Maharashtra (59.55), Rajasthan (39.96) and Karnataka (41.81). Among Gujarat the maximum cases were seen in the three chief cities of the state; Ahmedabad, Rajkot and Vadodara. Better establishment of tertiary care facilities, isolation wards and availability of recognized testing laboratories in these places led to a greater number of patients being referred to these centers for management

Seasonal Trend

The suspected as well as confirmed cases rose during the winter months of December, January and February. As H1N1 is a viral disease that spreads via aerosols, the disease was expected to rise in winter months. With the fall in temperature during the winter months the spread of the disease via aerosols like any other influenza strain and like other respiratory viruses increased steeply so that 28% of all suspected and 37.9% of all positive were seen in the month of January itself.

Host Factors

The seasonal influenza A virus is believed to affect the individuals in extremes of ages. But this strain is believed to affect the younger individuals more. As in 1918 pandemic, where the most affected were the young individuals, here also the disease seems to be affecting the younger age groups, likely reason to be the higher immunity. Higher immunity is associated with a robust immunological response and cytokine storm making the disease to be clinically apparent. The males being the one more exposed to the environmental virus and in contact with higher people are affected more than their female counterparts.

Treatment

In spite of creating awareness among the local people, the latency to coming for treatment was very long. Maximum persons (52%) were started on Oseltamivir after 5 days of onset of symptoms, when the disease is believed to cause a rapid deterioration within 3 days of onset of symptoms. Only 5 and 7 percent patients had treatment available within 24 and 48 hours of onset of symptoms respectively. This explains the reason for the poor outcome of patients. However, with continuous awareness campaigns and Government liberalizing the sale of Oseltamivir, there has been more than two times rise in the sale of Oseltamivir in 2010 as compared to the last 6 weeks of 2009. This indicated the loss of fear and apprehension in local practitioners in prescribing Oseltamivir.

Mortality

The reported deaths occurring throughout the world are 16226 of which 1385 are in India itself and 297 (case fatality rate 19.9%) in Gujarat indicating a very high case fatality in India and

Gujarat as compared to the rest of the world (case fatality rate 2.31%). The reason for such a high mortality can be considered because of selection bias. As only the patients falling in Category C were subjected to testing and not the stable patients falling in Category B, many more vitally stable and H1N1 positive patients are exempted from the study. This kind of categorization is not followed elsewhere in the world. So the case fatality in the state appears significantly higher compared to the rest of the world. However, even in the context of India, the incidence of death per 10 lakh population was second highest in Gujarat (6.02), only behind Delhi (7.04). Maximum deaths occurred during the month of January, the case detection rate being higher in that month. Also, the highest mortality was seen in Ahmedabad. Maximum deaths were seen in young age group, 13-45 years (case fatality rate = 19.6%) and most of those had no co morbid illness (69%). But the overall mortality was higher in those above 45 years of age (case fatality of 26.8% as compared to 19.6%). Though males were affected more than females, the mortality was higher among the females, indicating not only a late referral but also the severity of disease being more in women, especially, pregnant women. 41% of expired patients were referred patients, showing that transportation of such individuals from one center to another and thereby delaying the treatment was associated with poor outcome. Most of the patients who eventually succumbed to the disease, succumbed within 1 to 24 hours of admission (35%), the reason being the approach to the health care facility at a much later stage when the cytokine storm had already established and respiratory failure imminent on admission.

Conclusion

With incidence ratio being 5th and mortality ratio being 2nd in the country, Gujarat was one of the most affected state in the country with H1N1. Ahmedabad, Rajkot and Vadodara were the most affected districts in the state with a steep rise in cases in winter. Young individuals between 13 and 45 were the most affected causing a significant losses of DALY's (Disability Adjusted Life Years) to the state. The mortality was also significantly higher as compared to the rest of the world because of selection bias of only vitally unstable patients as per the guidelines by the centre and late approach to the health care facility by the patients.

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