Epidemiological and virological characterization of influenza A virus subtype H1N1 at tertiary-care hospital, Ahmedabad

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Background: In April 2009, a new strain of influenza virus, A H1N1, started to spread in various parts of the world, and the first case was reported on May 16, 2009.[1] The associated morbidity and mortality have made it a major health burden. In this study, we have investigated samples of patients with suspected influenza-like illnesses (ILIIs) received at civil hospital, Ahmedabad, from January 1, 2015 to March 15, 2015.

Objective: To study the epidemiologic and virologic profiles of patients found positive for influenza A H1N1 at a tertiary-care hospital.

Materials and Methods: Nasopharyngeal and oropharyngeal swab specimens from patients presenting with ILI were received and subjected to real time RT-PCR (rRT-PCR) for detection and characterization of swine influenza and other seasonal influenza.

Result: Of the 6,197 specimens tested, 3,242 and 866 yielded swine H1N1 and seasonal influenza virus, respectively. Most specimens were received from children aged <10 years (22.8%). Among those with confirmed swine H1N1 infection, 1,679 (51.79%) were female subjects.

Conclusion: The high proportion of respiratory specimens positive for influenza A H1N1 was owing to higher transmissibility of H1N1 than other seasonal influenza viruses. The age distribution of cases of influenza A H1N1 infection suggests that children and young adults could be targeted for interventions to reduce transmission during an influenza pandemic.

KEY WORDS: H1N1, real time reverse transcriptase polymerase chain reaction (rRT-PCR) assay, tertiary-care hospital.

Introduction

Influenza A (H1N1) virus was identified in humans in Mexico and the United States in April 2009[2] and has since spread worldwide.[3] The transmissibility of the influenza A H1N1 virus was estimated to be higher than that of other seasonal influenza viruses.[4] Influenza A H1N1 infections have been primarily seen among young children, suggesting that they are the most vulnerable to infection.[5] In the clinical diagnosis of influenza, nucleic acid testing by reverse transcriptase polymerase chain reaction (RT-PCR) has widely replaced traditional virus culture owing to shorter turnaround time and increased sensitivity.[6] To limit community or hospital transmission, and to initiate antiviral therapy on time, the rapid detection of the virus in suspected cases remains crucial.[7] Most cases of H1N1 infection present as mild or subclinical pneumonia. With this background, this study was conducted to compare epidemiologic and virologic characteristics of H1N1-positive patients with those of uninfected and those of infected with other seasonal influenza viruses.
Laboratory confirmation of A (H1N1) influenza virus was made by taking two–oropharyngeal and nasopharyngeal swabs of persons suspected of having influenza-like illness (ILI) in accordance with the protocol from Centers for Disease Control and Prevention (CDC), as recommended by the WHO.[8]

Specimen Collection

Samples were received from patients with ILI admitted at civil hospital (OPD and indoor) and at the private health sector, which encompasses private clinics and hospitals. A total of 6,197 samples were received in universal viral transport media at 4°C with demographic and clinical details of each patient from January 1, 2015 to March 15, 2015.

Virus Detection

All the specimens were tested using the CDC real-time reverse-transcription polymerase chain reaction (rRt-PCR) protocol for detection and characterization of human and swine influenza virus.[8] This detection kit includes panels of oligonucleotide primers and probes for the identification of influenza A virus, seasonal subtype swine A and swine H1N1. For performing rRT-PCR assays, we extracted RNA from specimen using the QIAamp Virus RNA Kit (Qiagen). We performed the RT-PCR assays using a Qiagen RT-PCR kit as recommended by the manufacturer. Purified RNA was reverse transcribed and amplified, and reactions were first incubated at 50°C for 30 min, followed by 95°C for 10 min, then thermal-cycled for 45 cycles (95°C for 15 s, 57°C for 30 s for each cycle.).

Data Analysis

We recorded the demographic and clinical characteristics of patients with suspected and confirmed cases of H1N1 infection. The $\chi^2$-test was used for analysis. $P$ values of <0.05 were considered to be statistically significant.

Result

A total of 6,197 specimens were received from January 1 to March 15, of which 3,242 (52.31%) cases were confirmed positive for novel strain of influenza subtype H1N1, and 866 (13.97%) cases were positive for other seasonal influenza strain.

Overall, the majority of the specimens received (22.84%, 1,416 of 6,197) and the confirmed cases of H1N1 infection (21%) involved children aged < 9 years [Table 1]. Among patients with confirmed swine H1N1 infection, 1,679 (51.79%) were female subjects [Table 2].

The most common symptoms were cough (78%) and fever (77%), followed by sore throat (62%) and dyspnea (52%) in confirmed positive cases for H1N1 [Table 3]. Among patients admitted at civil hospital, Ahmedabad, a total of 1,377 samples were received from January 1 to March 15, 2015, of which 735 (53%) were positive for H1N1, and 180 deaths were reported. A case-fatality rate was reported to be 24%.

Discussion

Although cases of H1N1 infection were reported throughout the year 2014, a peak was observed in March 2014. Suddenly, number of samples and positivity rate increased with an average of 55% in January–February 2015. The peak of the cases were reported in the month of January–February, the classical season of influenza [Figure 1]. As reported earlier, individuals aged 0–9 years accounted for the highest number of cases of H1N1 infection (21%). Thus, to reduce transmission during an epidemic, this population might be a key target for vaccination. The most common symptoms with which patients presented were fever, cough, sore throat, and difficulty in breathing. Among patients with confirmed swine H1N1 infection, 1,679 (51.79%) cases were female subjects.

Comparison with Other Studies

The outbreak predominantly affected the young age group (0–9 years). Similar studies conducted in Maharashtra and Delhi reported the most affected age group as 20–39 years.[12,15] The variance might be owing to a greater number of pediatric samples than other age group. The time of occurrence also corresponds to that of peak season of transmission.[14] The symptom distribution is also consistent with studies conducted in Kolkata, China, Saudi Arabia.[9,10,11] Our study revealed that female subjects encountered more frequent infections than male subjects, which may vary with different studies; however, there was no statistical difference in symptoms between swine H1N1 and other seasonal influenza infection.

Strengths and Limitations

High prevalence and mortality may be attributed to the study population restricted to a small geographical area.
Geographical conditions have not been accounted, which may have a significant impact on prevalence and morbidity.

**Conclusion**

It can be concluded from this study that the prevalence of influenza A (H1N1) is high in the month of January to March among children (0–9 years). The most common symptoms with which the patients presented were fever, cough, and sore throat.

Preventive interventions that can be used to reduce H1N1 transmission are H1N1 vaccination to priority groups such as school-going children and health-care and emergency service personnel; incorporation of infection control practices as a part of standard precautions; triage procedures and engineering controls that separate ill patients from the infected ones.

**References**


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