Study on the clinico demographic profile and prevalence of human influenza cases among the severe acute respiratory illness cases in a rural teaching hospital of West Bengal, India

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ABSTRACT

Background: Influenza is an infectious disease caused mainly by influenza virus types A and B. High frequency of mutation and genetic reassortment results in the introduction of a new influenza strain which causes major epidemics and pandemics. **Aims and Objectives:** The aims and objectives of this study were to find the incidence of Influenza A and B viruses as well as the subtypes of influenza A (H1N1 pdm09 and H3N2) among patients admitted at our hospital with severe acute respiratory illness (SARI) and also to find the demographic characteristics and seasonal distribution of the influenza cases. **Materials and Methods:** This study was done for one year at the Department of Microbiology of Tamralipto Government Medical College and Hospital, Tamluk, West Bengal with 310 samples from patients admitted at our hospital with SARI. Viral ribonucleic acid (RNA) extraction was performed using QIAamp Viral RNA Mini Kit by QIAGEN kit followed by performing real-time-polymerase chain reaction (RT-PCR) by applied Biosystems 7500 Fast Dx by Thermo Fisher Scientific for typing and subtyping of influenza virus using VIASURE RT-PCR Detection Kits. **Results:** Among the 310 SARI patients tested by RT-PCR, 25 (8.06%) patients tested positive for influenza virus out of which 18 patients (72%) were positive for influenza A, whereas 7 patients (28%) were positive for influenza B. Out of the 18 influenza A virus-positive samples, 12 samples (66.67%) were positive for H3N2 subtype and 6 samples (33.33%) were positive for H1N1 subtype. Most of the Influenza positive patients belonged to the age group of 26–40 years and the majority of the influenza cases were detected during monsoon and post-monsoon season. **Conclusion:** Influenza is a major challenge to public health which causes many complications and deaths each year. Early detection by RT-PCR among suspected cases will determine the prevalence of influenza and help in the appropriate treatment in time, which will reduce complications and mortality.

Key words: Influenza A; Real time-polymerase chain reaction; H3N2

INTRODUCTION

Influenza, commonly known as flu, is an infectious disease caused by the influenza virus which has four types A, B, C, and D, and is based on the hemagglutinin and neuraminidase proteins on the surface of the virus, influenza A is further classified into various subtypes. Most human infections are caused by Influenza virus types A and B[1] and most of the subtypes of influenza A virus cause zoonotic infection but they may undergo genetic changes and infect humans, causing major epidemics and pandemics.[2] Currently circulating influenza virus types and

subtypes among humans are influenza A (H1N1) pdm09, influenza A (H3N2), and influenza B.[1]

In temperate climate, seasonal epidemics occur mainly during winter, whereas in tropical regions influenza may occur throughout the year.[3] In the majority of individuals influenza causes minor symptoms such as fever, headache, malaise, myalgia, sore throat, and running nose but in individuals with high risk such as pregnant women, children, the elderly, immuno-compromised individuals, influenza may cause severe illness like pneumonia.[4]

High frequency of mutation and genetic reassortment causes antigenic changes in the viral surface glycoprotein resulting in the introduction of a new influenza strain that is antigenically very different from any previous one and the lack of pre-existing immunity in humans is often associated with the severity of the infection and increased mortality.[5]

Influenza is often underdiagnosed as it shares common non-specific clinical features with other respiratory illnesses;[6] therefore, an urgent diagnosis is necessary for epidemiological purposes and appropriate management. Early, rapid, and accurate diagnosis with real-time-polymerase chain reaction (RT-PCR) will help to start early treatment with antivirals which will reduce complications and death both during seasonal epidemics and pandemics.

Aims and objectives
To find the incidence of Influenza A and B viruses as well as the subtypes of Influenza A (H1N1 pdm09 and H3N2) among patients admitted at our hospital with severe acute respiratory illness (SARI) and also to find the demographic characteristics and seasonal distribution of the Influenza cases.

MATERIALS AND METHODS

This is a cross-sectional study which was performed from January 1st to December 31st, 2024 at the Department of Microbiology of Tamralipto Government Medical College and Hospital, Tamluk, West Bengal. The study included 310 samples received from patients admitted to our hospital with severe acute respiratory illness (SARI).

Viral transport media containing nasopharyngeal swabs from SARI patients of all ages and gender admitted at our hospital was received at our laboratory. Viral RNA extraction was performed using QIAamp Viral RNA Mini Kit by QIAGENkit followed by performing RT-PCR by Applied Biosystems 7500 Fast Dx by Thermo Fisher Scientific for typing and subtyping of Influenza virus

using VIASURE RT-PCR Detection Kits. The graph generated during PCR was qualitative and a cutoff cycle threshold value of <40 was considered as positive result for both Influenza typing and subtyping RT-PCR.

Results were interpreted and analyzed by Microsoft Excel 2010 and SPSS Version 9.0 Software.

RESULTS

Among the 310 SARI patients tested by RT-PCR, 25 (8.06%) patients tested positive for influenza virus out of which 18 patients (72%) were positive for Influenza A while 7 patients (28%) were positive for Influenza B as shown in Figure 1. Out of the 18 influenza A virus-positive samples, 12 samples (66.67%) were positive for the H3N2 subtype and 6 samples (33.33%) were positive for the H1N1 subtype as shown in Figure 2.

16 (64%) out of the 25 influenza positive cases were males, whereas 9 (36%) were females as shown in Table 1.

Most of the Influenza positive patients belonged to the age group of 26–40 years (28%) followed closely by children <12 years of age (24%) and elderly patients >60 years of age (24%) as shown in Table 2.

The majority of the Influenza cases were detected during monsoon and post-monsoon season as shown in Figure 3.

Among all the influenza patients, fever (88%) was the most common symptom followed by malaise (84%), headache (72%), cough (72%), rhinorrhea (68%), sore throat (60%), and shortness of breath (SOB) (40%) as shown in Table 3.

Out of the 25 influenza patients, 19 patients were treated in the hospital wards while 6 patients required admission to critical care.

DISCUSSION

Every year both influenza A and B virus causes seasonal epidemics and influenza A virus has also resulted in four major pandemics. This is due to the high frequency of mutation and genetic reassortment, resulting in antigenic changes in the viral surface glycoprotein. In a study by Kulkarni et al., it has been mentioned that since the 2009 pandemic, which resulted in 27236 cases and 981 deaths, Influenza activity continued to be reported every year.[7] It has also been mentioned in the study that earlier, cases were
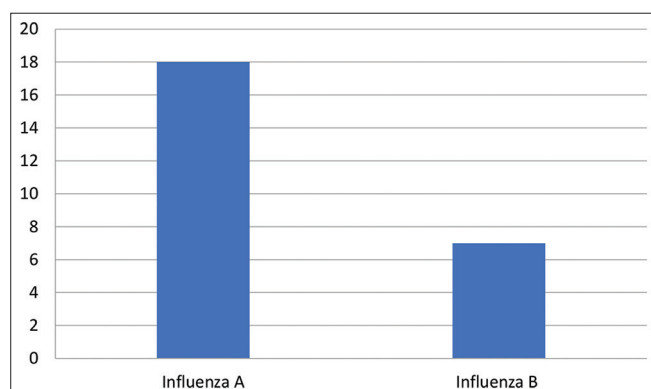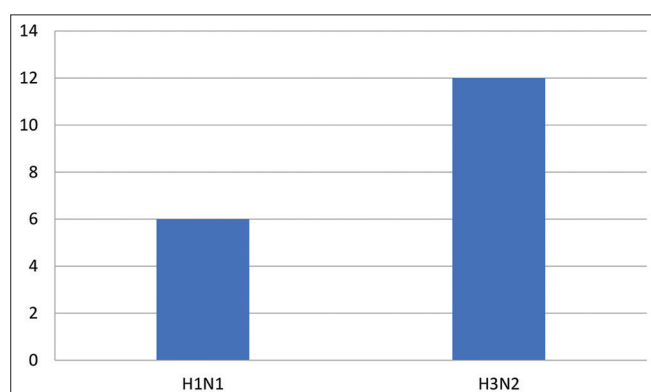
Figure 1: Influenza types among the study subjects
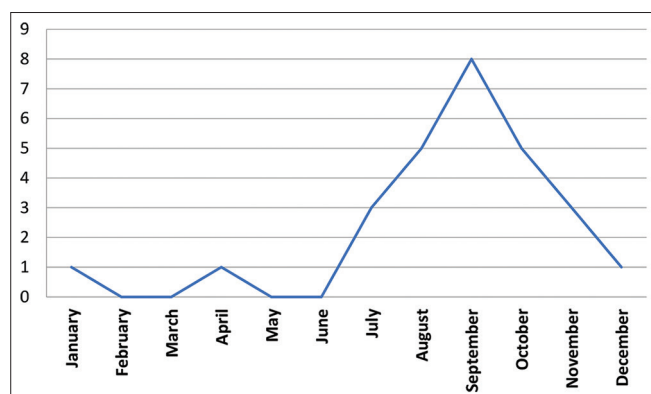

Figure 2: Distribution of influenza A virus subtypes

Figure 3: Seasonal distribution of influenza cases

Table 1: Gender distribution among influenza positive cases

Gender	Number	Percentage
Male	16	64
Female	9	36

Table 2: Age distribution of Influenza positive cases

Age group	Number	Percentage
0–12 years	6	24
13–25 years	4	16
26–40 years	7	28
41–60 years	2	8
>60 years	6	24

Table 3: Clinical features of the influenza patients

Clinical features	Number	Percentage
Fever	22	88
Malaise	21	84
Headache	18	72
Cough	18	72
Rhinorrhoea	17	68
Sore throat	15	60
Shortness of breath	10	40

reported only from the western part of India but since 2017 laboratory-diagnosed cases have been reported for the 1st time from northeastern and eastern states of India.[7]

In our study, among the 310 SARI patients tested by RT-PCR, 25 (8.06%) patients tested positive for Influenza virus out of which 18 patients (72%) were positive for Influenza A while 7 patients (28%) were positive for Influenza B. Out of the 18 Influenza A virus-positive samples, 12 samples (66.67%) were positive for H3N2 subtype and 6 samples (33.33%) were positive for H1N1 subtype. The findings of our study differ from other studies done in the past. In a

study done in Andhra Pradesh in 2017–2018 by Mudhigeti et al., it was found that positivity for Influenza was 40%, and out of all the positive samples, 96% were positive for Influenza A and 3.6% were positive for Influenza B; out of the Influenza A cases, 70% were H1N1, 7% were H3N2 and 21% were non-sub-typable.[8] Another study done in Eastern India in 2009 by Mukherjee et al., detected positivity for Influenza A was 12.8%; out of which, 74.35% samples were confirmed for pandemic H1N1/2009 and 11% as H3N2.[9] In a study on Influenza in central India by Arbat et al., it was found that out of all the patients tested for suspected H1N1, 68% were positive[10] while in a study by Biswas et al., done in Kolkata positivity for H1N1 was found to be 29%.[11]

Positivity for Influenza was found to be less in our study than in the previous studies. This might be due to the fact that most patients remained undiagnosed due to less severe symptoms mimicking the common cold.

There was a male preponderance (male 64%, female 36%) in our study which matched with the previous studies.[12,13] Such a finding may be explained due to more outdoor exposure of male persons in general.

In our study, the most common age group affected was found to be 26–40 years which is similar to the findings in a previous study conducted by Siddharth et al.[14] However, the

findings differ from several other studies where maximum influenza cases were diagnosed in the older age group[9,15,16] as well as a few studies where the younger age group was affected the most.[8,12]

Maximum numbers of influenza cases in our study were seen during monsoon and post-monsoon season which matches with the findings of the study conducted by Chadha et al.,[17] reporting similar seasonal distribution from several cities in India.

Common presenting symptoms in our study were fever, malaise, headache, cough, rhinorrhoea, sore throat, and SOB which is quite similar to the findings in a study done in Andhra Pradesh by Mudhigeti et al.,[8] as well as another study done in Kolkata by Biswas et al.[11]

Fever was the most common presentation in our study which closely corroborates to studies by Prasad et al.,[15] and Kshatriya et al.,[16] Cough was seen among 72% of patients participating in our study which matches the finding in a study by Biswas et al.,[11] done in Kolkata but differs from studies by Arbat et al.,[10] and another study by Kshatriya et al.,[16] where cough was found in 89% and 100% patients respectively. Respiratory distress was observed among 40% patients of in our study which is a close finding to the study by Arbat et al.,[10] where 37% of patients suffered from respiratory distress. This differs from the findings of studies by Kshatriya et al.,[16] Prasad et al.,[15] Biswas et al.,[11] where respiratory distress was observed among 83%, 54%, and 25% patients, respectively.

In our study, out of the 18 influenza positive patients, 6 (24%) patients required admission in the critical care unit. Among these six patients, only one patient was <5 years age while the rest were >60 years of age and had associated co-morbidities such as hypertension, diabetes mellitus, and chronic obstructive pulmonary disease. Out of the six patients, four patients were diagnosed with H1N1, and the rest two patients H3N2. In a study by Potdar et al.,[18] most patients with co-morbidities required intensive care unit admission.

The mean duration of hospital stay in our study was found to be 7 days which is more or less similar to the findings in studies by Sardar et al.,[12] and by Kshatriya et al.,[16] where the mean duration of stay at hospital were 6.5 days and 6.32 days, respectively.

Limitations of the study
Subclinical cases of suspected influenza with less severe symptoms not admitted to the hospital were excluded from our study population.

CONCLUSION

Influenza is a major challenge to public health which causes many deaths each year and will continue to do so in the future. Therefore, there is a need to have a high index of suspicion and ensure that patients are attended to in a timely manner. Early detection by RT-PCR among suspected cases will determine the prevalence of influenza and help in the appropriate treatment in time, which will reduce complications and mortality.

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