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An Upsurge In Influenza B Cases, A 3-Year Trend In Haryana State In Northern India

Tanuj Gupta[1], Manisha Khandait[1], Paramjeet Singh Gill[2], Dinesh Kumar Sharma[1], Mukesh Sharma[1]
[1]Microbiology Department, Sgt University, Gurugram, [2]Microbiology Department, Pt. B. D. Sharma, PGIMS, Rohtak

Abstract

Introduction: *An upsurge of Influenza B cases has been seen in the past few years causing influenza like illness and severe acute respiratory infection especially in children < 5 years. We analysed the prevalence of Influenza B virus infection in the past 3 years (2022-23 to 2024-25) with respect to lineage, severity of infection and age distribution.*

Methodology*: Nasopharyngeal and oropharyngeal swabs from ILI and SARI patients were collected in VTM and real-time PCR was conducted on all samples. The RT-PCR kits tested Inf A (H1N1) pdm09, Influenza A (H3N2) and Inf B, and Victoria and Yamagata lineages of Influenza B.*

Results*: Over the past 3 years, out of a total of 797 samples tested, 218 (27.3%) were positive for Influenza infection, out of which 100 (45.9%) samples were positive for Inf B infection. Most Inf B cases were seen in the year 2022-23 (76.6%) followed by 2024-25 (60.8%). All Inf B infections belonged to Victoria lineage. Out of the total Inf B infections, 51% cases were children (1-5 years of age). Cases of SARI were 3 times the ILI cases affected by Inf B.*

Conclusion*: Various Inf types and their subtypes circulate in the community but only one subtype predominates every year with their propensity towards specific age groups. Over the past few years, rise in Inf B virus cases each year warrants a stringent look at the active surveillance and implementation of flu vaccination especially for children <5 years to reduce morbidity and mortality.*

Keywords*: Influenza, Influenza B, Victoria lineage (Inf B), SARI*

INTRODUCTION

Influenza is a major public health problem worldwide with high rate of morbidity and mortality.[1,2] It is one of the most common respiratory infectious diseases. There are three types of influenza viruses A, B, and C based on different structural arrangements of internal nucleoprotein and matrix protein antigens. Influenza A has been of huge concern as it has led to several pandemics in the past,[3,4] whereas Influenza B is the less studied Influenza type as it has contributed less than 25% of Influenza cases worldwide with lower mortality rates.[5] However, significant changes in the pattern of Influenza B infection have been observed in the post-COVID era. Since 2022, a constant upsurge of Influenza B cases has been seen as compared to Influenza A.[6] All Influenza cases belonged to Victoria lineage.[6] Another important observation seen is in the typical seasonal pattern of Influenza B infection. The Influenza B infection peak correlates with the end of winter season and the cases start to rise in Feb-March and subside in May.[6] We present the prevalence of Influenza B, its propensity to younger age group, the seasonal pattern and the predominant lineage in the northern state of India.

MATERIAL AND METHODS

The study was conducted at a tertiary care medical college and hospital, Pt B D Sharma Postgraduate Institute of Medical Sciences, Rohtak (Haryana) in collaboration with S G T Medical College, Hospital and Research institute Budhera, Gurugram (Haryana), India during June 2022 to May 2025. The study protocol was approved by the Institute Ethics Committee. All patients presenting with Influenza-like Illness (ILI) and Severe Acute Respiratory Infection (SARI) were included in the study. Nasopharyngeal and oropharyngeal swabs from the patients were collected by the clinician and transported to the ICMR funded Viral Research

and Diagnostic Laboratory (VRDL), Department of Microbiology, PGIMS under strict cold chain measures as per the national guidelines. In the VRDL, the samples were stored at 4°C and tested within 12 hours. Firstly RNA was extracted from all samples using QIAmp® RNA viral Mini kit from Qiagen, USA, then the extracted RNA (elute) was subjected to Real-time polymerase chain reaction using commercially available multiplex RT-PCR kits detecting Influenza A, Inf A pdm09H1, Inf A H3N2, Influenza B. All Influenza B positive samples were further tested for Victoria and Yamagata lineages using RT-PCR kits developed using CDC primer-probe sequence from National Institute of Virology (NIV), Pune and used after validation with the quality control samples provided by NIV Pune. Demographic and clinical details of the patients were obtained and recorded. Clinical details included presenting signs and symptoms, duration of symptoms and underlying medical conditions. Patients were divided into 5 age groups, i.e., 1-5 years, >5-15 years, >15-35 years, >35-60 years and >60 years.

RESULTS

A total of 797 samples (nasopharyngeal and oropharyngeal swabs in VTM) from ILI and SARI cases were tested by multiplex RT-PCR Flu kit over the period of 3 years (June 2022 to May 2025). Out of 797 samples, 218 (27.4%) samples were positive for Influenza virus infection.

yearly positivity: total number of Influenza cases in the year 2022-23 were 64 out of 340 samples tested (18.8%), in 2023-24, they were 75 out of 205 samples tested (36.5%) and in 2024-25, 79 out of 252 samples tested (31.3%). Overall, out of the total of 218 Influenza positive samples, 100 (45.9%) were positive for Influenza B, 73 (33.5%) for Influenza A (H1N1)pdm09 and 45 (20.6%) for Influenza A (H3N2) in the past three years.

Predominant Influenza subtype: Influenza B was seen to be dominating the 2022-23 and 2024-25 winter Flu season with 49 (76.6%) out of 64 and 48 (60.8%) out of 79 total Influenza positive cases, respectively. However, Influenza A (H1N1) pdm09 was the sole predominant Influenza subtype in 2023-24 winter flu with 71 out of 75 total Influenza positive cases accounting to 94.7% positivity (Figure 1). Table 1 describes the yearly positivity rate, predominant Influenza subtype/lineage, age group propensity, seasonality and severity of infection of Influenza.

Influenza B cases

Table 2 describes Age, gender and symptomatology wise distribution of Influenza B cases

Lineage: It is pertinent to mention that all Influenza B infections belonged to Victoria lineage and no case of Yamagata lineage was observed in all three years.

Seasonality: Influenza B cases were seen to rise with receding winters from February to May with the peak seen in February-March, where as Influenza A (H1N1) pdm09 cases were seen from November to March with maximum cases seen in December-January coinciding with winters peak (Figure 1).

Age group and gender affected: For Influenza B infection, the most affected age group was children aged 1-5 years with 51 (51%) cases followed by age group >15-35 years with 25% positivity. The least affected age group was >60 years (2% positivity). Males (61%) were more frequently infected than females (39 %) in all age groups.

Severity of Infection: Among the 100 Influenza B infected cases, 77% were SARI whereas only 23% were ILI with predominant symptoms being fever (100%), cough (75%), sore throat (51%), breathlessness (73%), pneumonia (12%) and Diarrhoea (2%).

DISCUSSION

Important observations in our study were:

1. There is an observable persistent increase in number of Influenza B cases over the past 3 years accounting for 76.6% of total Influenza cases in 2022-23 and 60.8% in 2024-25.

2. Almost all the Influenza B cases have been seen during the months of February to May, after the typical winter flu months of Influenza A.
3. All the Influenza B infections belonged to Victoria lineage (100%).
4. Influenza B mainly affected children particularly 1-5 years of age (51%)

Perusal of the literature confirmed that during 2023-24 Influenza A (H1N1) pdm09 predominated the winter seasonal flu in India as well as globally (NCDC seasonal Influenza A data 2024). In the year 2022-23, we observed maximum number of Influenza cases belonged to Influenza B (76.6%). Mathivanan et al. reported Influenza A (H1N1) as the predominant subtype causing seasonal flu in the southern India (Tamil Nadu).[8] However, in United States, Influenza A (H3N2) subtype was the predominant subtype that circulated during the single wave of activity that peaked in late November and early December 2022.[9] As has been observed that all three subtypes (H1N1, H3N2 and Influenza B-Victoria lineage) simultaneously cause infection with one subtype predominating in particular region. In our region Influenza B was seen as the dominant subtype in the winter season of 2022-23 and 2024-25. Currently beginning from February 2025, a sudden upsurge of flu cases caused by Influenza B has been reported from northern India including Delhi-NCR as well as Kolkata and this upsurge has been attributed to the change in atmospheric temperature favoring propagation and spread of Influenza B.[10,11]Global Influenza B Study (GIBS) analyzed Influenza data of 31 countries from 2000-2018 and observed that peak months for Influenza B infection in northern hemisphere is February-March.[12] Kini et al also reported peak incidence of Influenza B infection in children in the month of March. Similar findings were observed in our study as well with Influenza B peak in March and infection extending till May.[7]Over the past 3 years, 51% of total Influenza B infection has been seen in children 1-5 years of age. Influenza B has the predilection to infect the younger age groups. Various global studies also corroborate our observation of young children being more susceptible to Influenza infections especially Influenza B for they being immunologically naïve.[13,14] Peltola et al also reported highest frequency of Influenza B infections occurred in infants less than one year of age with the median age of children being 4.2 years.[15]In our study we observed higher prevalence of Influenza B infection in males as compared to females (1.5:1). Similar findings have also been observed by Kini et al (1.5:1)[7] and slightly higher prevalence has been observed by Janani et al (1.7: 1)[16] from southern India. When considering male-female prevalence with regard to infectious diseases as such, the prevalence is dependent on various social behaviours and outdoor activities. It can be assumed that in a country like India where in most of the rural areas as well as urban areas, males have more outdoor movement either to earn their living or as a choice and freedom as compared to females making them more prone to exposure to infections with Influenza viruses or other infectious disease. It is important that prevalence of infection should be differentiated from susceptibility for an infection. Very few studies have been conducted to study the susceptibility of males and females to Influenza infection. Even though our study is limited to Influenza B infection, we would like to describe a study conducted by Giurgea et al analyzing the susceptibility of males and females to Influenza A virus. Giurgea et al conducted a challenge study with 164 healthy volunteer who underwent Influenza A/California/04/2009/H1N1 challenge and the data was compiled to compare difference in susceptibility pattern in both sexes. They concluded that females in their cohorts were more likely to be symptomatic and to have a higher number of symptoms than males.[17] Therefore, even though there are higher reported cases of Influenza virus infection in males, females have been observed to be more susceptible to these viruses.The number of SARI cases (77%) caused by Influenza B was 3 times higher than the ILI cases (23%). This can be due to the fact that most of the ILI cases do not report in the OPDs and prefer self medication with antibiotics on advice from the pharmacist in the medical shops, thus get undetected and under-reported, however, when the infection gets severe and symptoms get worse, such cases require hospitalization (denoted as SARI cases) and undergo comprehensive testing and treatment. Thus the SARI cases data represent a true prevalence of Influenza infection. In our study the predominant symptoms seen in Influenza B cases were fever (100%),

cough (75%), sore throat (51%), breathlessness (73%), pneumonia (6%) and diarrhoea (2%). Unfortunately, we cannot include the data of most of the ILI cases in the community who are not tested and thus the data on ILI cases is under-reported. However, in our study, most of the ILI cases suffered from fever with cough and sore throat. Similar findings were also reported by Yunker et al in the year 2023-24 at John Hopkins health system where they observed that Influenza B caused milder infection.[18] Table 2 describes the demographic and clinical characteristics of Influenza B cases in our study.

CONCLUSION

Influenza illness poses a significant burden, particularly among young children, older adults, and those with co-morbidities. World Health Organization reported that there are around a billion cases of seasonal influenza annually, including 3–5 million cases of severe illness. It causes 2,90,000 to 6,50,000 respiratory deaths annually. Ninety-nine percent of deaths in children occur under 5 years of age with influenza-related lower respiratory tract infections are in developing countries.[19] This is the scenario when there are vaccines and anti-viral agents available. Plethora of studies are available regarding the understanding of flu seasons, seasonal flu vaccines for northern and southern hemispheres and antiviral agents. In order to curtail the morbidity and mortality by Influenza infections, a few important steps need to be implemented.

1. Intensive public awareness regarding Influenza signs and symptoms throughout the year especially before seasonal flu months i.e., June-July for monsoon and post-monsoon flu season and October-November for winters and Jan-Feb for Influenza B infection).
2. Influenza Immunization drive for children less than 5 years of age with seasonal trivalent vaccines developed for that particular year and region.
3. Active Influenza surveillance to identify ILIs and suggesting appropriate treatment after testing.
4. Special Influenza clinics for children and adults to be established in hospitals during the flu seasons for testing and treating Influenza cases. It has been observed if anti-influenza treatment is started within 72 hours of start of symptoms, the morbidity and duration of illness is significantly reduced.
5. Use of multiplex real time PCR testing with respiratory panels detecting various viral and bacterial respiratory pathogens for appropriately detecting and treating the patients

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Conflict of Interest: There are no conflict of interest

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Table 1: Yearly distribution of Influenza infection with predominant subtype, age, peak months and severity of infection

Characteristic	**June 2022-May 2023**	**June 2023-May 2024**	**June 2024-May 2025**
Samples tested	340	205	252
Total Positive	64	75	79
Inf distribution (H1/H3/B)	01/14/49	71/01/03	01/30/48
Inf distribution (H1/H3/B) %	02/22/**76**	**95**/01/04	01/38/**61**
Predominant Influenza type	Influenza B	Influenza A	Influenza B
Subtype/lineage	Victoria	H1N1 pdm09	Victoria
Predominant age group affected			
• *Inf A (H1N1) pdm09*	>35-60 years (1/1, 100%)	>35-60 years (23/71, 32%)	>15-35 years (1/1, 100%)
• *Inf A (H3N2)*	>35-60 years (8/14, 57%)	>60 years (1/1, 100%)	1-5 years (16/30, 53%)
• *Influenza B*	1-5 years (25/49, 51%)	1-5 years (2/3, 67%)	1-5 years (25/48, 52%)
Peak months	February-April	December-March	February-April
ILI /SARI (%)	16/48	08/67	17/62

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Table 2: Age, gender distribution and clinical features of Influenza B cases

Characteristics	**Influenza B Positive (100)**
Age group	
• 1-5 years	52
• >5-15 years	6
• >15-35 years	25
• >35-60 years	15
• >60 years	2
Gender (M:F)	1.5:1 (62:38)
Clinical symptoms	
• Fever	100
• Sore throat	51
• Cough	75
• Breathlessness	73
• Rhinorrhoea	52
• Vomiting	2
• Diarrhoea	2
• Pneumonia	12
• ILI	23
• SARI	77

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Figure 1: month-wise distribution from 2022-23 to 2024-25 of Influenza infection