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## Influenza Virus Among Children with Acute Respiratory Infections in Chennai, India

Influenza is a major public health concern. Information on the prevalence of influenza virus in respiratory tract infections in Indian children is very sparse. In the present study, 267 nasal swabs were collected from children with acute respiratory infections in Chennai, India, out of which 22 (8.2%) and 6 (2.3%) samples were positive for influenza A and B virus respectively.

**Keywords:** *Epidemiology, Etiology, Pneumonia.*

In developing countries, 30% of all childhood deaths are attributed to acute respiratory infections (ARIs) [1]. Due to its ability to cause frequent epidemics and periodic pandemics, influenza virus has a major public health implications. We enrolled 267 children aged 45 days to 16 years visiting the outpatient department of various hospitals and presenting with symptoms of ARI such as cough, fever, sore throat, rhinorrhea, nasal congestion, headache, myalgia, wheezing and dyspnea between April 2016 and March 2018. Children with chronic respiratory infections and other co-morbidities were excluded from the study. The study was approved by the Institutional Human Ethics Committee. Nasal swabs were collected using sterile flocked nylon swabs, which were inserted 2-3 cm deep inside the nostril and rotated 2-3 times. They were transported in a viral transport medium (HiMedia, India) to the laboratory maintaining cold chain. The vials were briefly vortexed, and RNA was extracted from the swabs using the NucleoSpin RNA virus kit (Macherey Nagel, Germany) according to manufacturer's instructions. The extracted RNA was converted to cDNA using RevertAid first strand cDNA synthesis kit (Thermo Fisher Scientific, USA), and stored at -20 °C.

cDNA was subjected to real time Reverse-transcriptase Polymerase chain reaction (RT-PCR) for the detection of influenza A and Victoria and Yamagata lineages of influenza B virus using hybridization probes

according to WHO protocol [2]. Real time RT-PCR was carried out in StepOnePlus real time PCR system (Applied Biosystems, USA). Appropriate positive and negative controls were included in each run. Ct value of  $\leq 40$  cycles was considered to be positive. The association between influenza positivity and demographic/epidemiological data was determined using two-tailed chi square test.

The mean (SD) age of the patients was 45.9 (38.5) months. The most common symptoms observed among the patients with ARI were cough (83.1%), rhinorrhea (60.3%) and nasal congestion (57.7%). The influenza A virus was detected in 22 (8.2%) samples, and 6 (2.3%) samples were positive for influenza B virus, of which three samples belonged to Victoria lineage and 3 belonged to Yamagata lineage of influenza B virus. The majority of influenza A virus positive patients had fever as the major symptom (17, 77.2%) followed by cough (16, 72.7%). Seven patients with influenza A virus had myalgia. Among the patients positive for influenza B virus (Victoria lineage), fever was the most common symptom, while cough was the frequent symptom associated with influenza B virus Yamagata lineage positive patients. The mean (SD) age of patients positive for influenza A and B virus was 49.9 (35.4) months and 68.2 (37.4) months, respectively. Influenza A showed highest rates of detection in the months of January and August 2017 (**Fig. 1**).

In the present study infection with influenza A virus was more common when compared with infection with influenza B virus. Previous studies from the region have shown similar results [3,4]. In an earlier study carried out in Chennai, 30 out of 240 (12.5%) children with ARI were positive for influenza viruses [5]. Fever and cough were the predominant symptoms among positive influenza A and B cases, similar to previous studies from India [4,6]. Studies on seasonal trends of respiratory viruses are very useful in predicting etiological agent during outbreaks. In our study, detection of influenza A virus peaked in the months of January and August. Studies from other parts of India reported detection of influenza A during autumn and winter seasons [7,8].

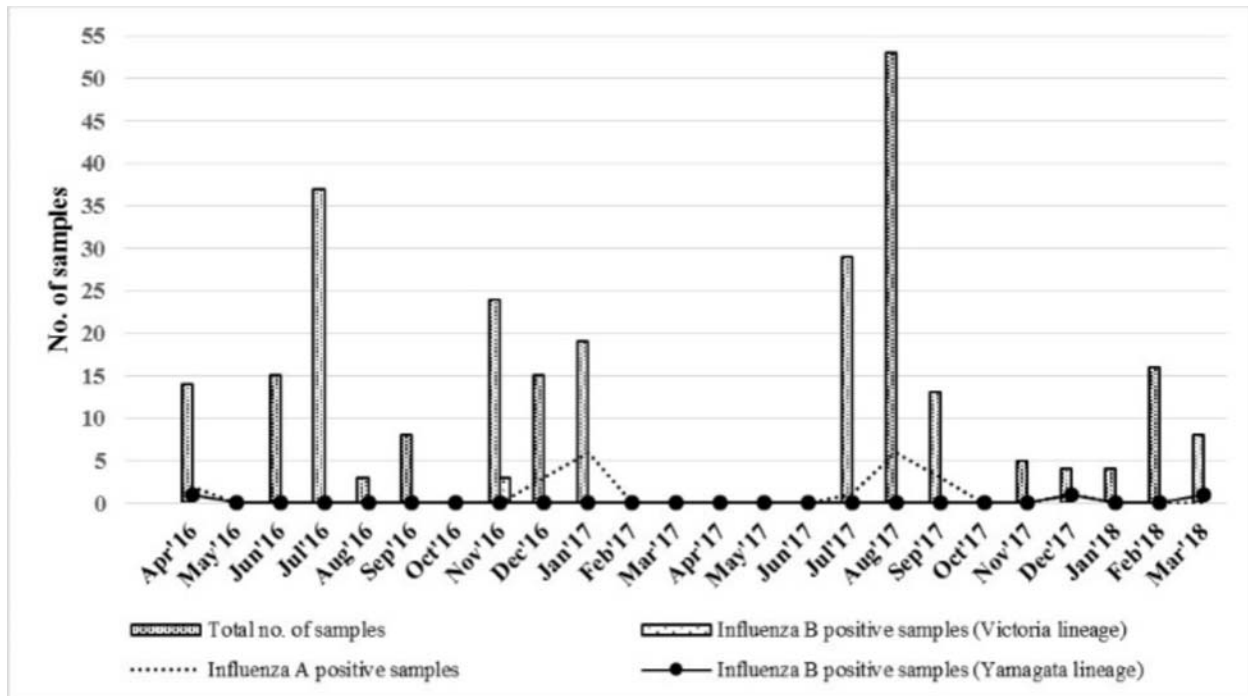


FIG. 1 Seasonal distribution of acute respiratory infections and influenza B infection in Chennai, India.

Limitation of the study was that samples were collected only from children with ARI, and not influenza-like-illness. The subtypes of circulating strains of influenza A virus were also not determined in the study.

The present study suggests influenza virus to be an important cause of ARI among children in Chennai, India. Large population-based studies using appropriate molecular methods are required to determine the prevalence of influenza viruses in children with ARI from different regions of India so that preventive strategies could be prioritized.

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