Prevalence of Respiratory Syncytial Virus in Children with Acute Respiratory Tract Infections in Chennai, India

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Abstract

Background: Respiratory syncytial virus (RSV) infection is considered to be one of the most common infections in children, causing significant morbidity and mortality. The study was conducted to analyse the burden of RSV in children with acute respiratory tract infection using real time PCR.

Materials and Methods: Respiratory samples were collected from children with acute respiratory tract infections belonging to age group of 0-10 years. Demographic details such as age and sex were examined. RSV was determined in respiratory samples using real time PCR. RSV positivity was correlated with clinical symptoms of children.

Results: A total of 101 respiratory samples were collected from children with acute respiratory tract infections. 30% of samples were positive for RSV by real time PCR. Majority of RSV positivity was reported in children below 2 years of age. No significant data was obtained on correlation between RSV positivity and clinical symptoms.

Conclusion: Our study provides data on the prevalence of RSV in children with acute respiratory tract infection in our region which highlights the importance of surveillance of RSV infection and healthcare planning.

Keywords
Respiratory syncytial virus (RSV); children; respiratory tract infection; real time PCR; molecular diagnosis

Introduction
Acute viral respiratory diseases are most important health concerns in infants and children [1]. Many respiratory viruses have been found to be the causative agents for the respiratory infections. However, Respiratory syncytial virus (RSV) is considered to be one of the leading causes of acute respiratory infections in children in both developed and developing countries [2-6]. According to a report, 66 million global cases of RSV associated lower respiratory tract infection have been reported in children [7]. The RSV infection in children results in negative impact on their quality of life. The clinical presentation of RSV infection ranges from mild upper respiratory tract infection to severe bronchiolitis [8]. Hence, RSV infection is considered to be one of the important risk factor of wheezing and asthma in children [8]. Epidemiological studies on RSV have provided a crucial data on relationship between the prevalence and clinical features of the diseases, which played a significant role in developing policies to control RSV infection and designing the RSV vaccines [9, 10]. Despite the prevalence of RSV infection in children being recognized worldwide, only limited data on RSV infection in children is available in our region [11-13]. Hence, the present study was carried out to determine the prevalence of RSV infection in children with acute respiratory tract infections using Real time Reverse Transcriptase Polymerase Chain Reaction (Real time RT-PCR).
Materials and Methods

Patients and samples
The study population included children aged between 0 – 10 years with one or more acute respiratory tract infection symptoms (fever, cough and wheezing) attending outpatient ward in tertiary care centre, Chennai, India, between January 2016 to December 2016. Basic demographic and clinical details were collected in a standard questionnaire before collecting the samples. Nasal swab or nasopharyngeal aspirate was collected after getting informed consent from parents or guardians of children. The clinical specimens were placed in 3ml viral transport medium (Himedia, India) and transported immediately at 4°C to laboratory for RSV virus detection. The study was approved by Institutional Human Ethical committee of Dr.ALM PG IBMS, University of Madras, India.

RNA extraction and cDNA conversion
RNA extraction was performed using NucleoSpin RNA extraction kit (Macherey-Nagel, Germany) from clinical specimens in accordance with manufacturer's protocol. Reverse transcription was done using RevertAid first strand cDNA Synthesis Kit (ThermoFisher Scientific, India) according to manufacturer instructions.

Real time PCR
Detection of RSV was done using real time PCR assay for RSV (Qiagen, Germany) as per manufacturer'sW instruction. CT value <35 were considered positive for RSV. Appropriate PCR positive and negative controls were included in the study.

Statistical analysis
Descriptive statistics was used to analyse the study data. P value of < 0.05 were considered statistically significant.

Results
Respiratory samples collected from 101 children aged <10 years were included in our study. Male children (70.3%) were predominant in our study population. Thirty percent (30/101) of the children with acute respiratory tract infections were positive for RSV. Among the RSV positive children, 83.3% (25/30) were male and 16.7% (5/30) were female children. In our study, RSV positivity was more prevalent in children aged between 0-10 months. Majority of children presented with cough (76.2%) followed by cold, fever and wheezing. All the RSV positive children showed at least one clinical symptom in our study. Among the RSV positive children, fever and cold (76.6%) were found to be the most common symptoms followed by cough and wheezing. No statistical significance was observed between the RSV positive children and clinical symptoms such as fever (P=0.11), cough (P=1), cold (P=0.80) and wheezing (P=1).

Discussion
RSV is considered to be one of the important causes of respiratory virus infections in children with acute respiratory tract infections. Tracking the prevalence of RSV infection in children would aid in understanding the epidemiology, which is important in executing the preventive measures. RSV prevalence rate in our finding (30%) was found to be consistent with previous report in our country. Broor et al., reported 30% of prevalence rate in north India [11]. In contrast to our study, Bharaj et al., Bhandary et al., and Yeolekar et al., reported 20.3%, 22% and 26% respectively [12-14]. There were considerable variations in the prevalence of RSV in children in various countries. Ahmed et al., reported 27% in Saudi Arabia [15]; Bashir et al., reported 24% in Pakistan [16]; Wang et al., reported 5.6% in China [17]; Rowlinson et al., reported 11.6% in Egypt [18]; Nolan et al., reported 9.7% in Australia [19]; Lamarao et al., reported 23.1% in Brazil [20]. The onset of RSV infection in earlier age group in our study is in agreement with previous studies [21-23]. Similar to the present study, other studies had also observed the prevalence of RSV to be more in male children [13, 22–24]. RSV infection has a range of clinical manifestation, which aid in differential diagnosis. However, in our study no significant differences were observed between RSV positive children and clinical symptoms. Most of previous studies were in agreement with our results, showing no significant differences in RSV positivity and clinical symptoms [25-28].

There are many limitations in our study. Our study was conducted in a limited number of study populations and the positivity rate may increase in higher number of population. Also the study was conducted in a single hospital, which may not represent the entire set of population in our region. Lack of seasonal patterns in our study may not ascertain the frequency of RSV in children in different climatic conditions. Our study may aid in understanding the burden of RSV in children, which will help in designing the strategies for the future vaccine and health care planning.

Reference


