

A CROSS-SECTIONAL STUDY OF THE VIRAL ETIOLOGICAL CORRELATES IN CHILDREN PRESENTING WITH ACUTE UPPER RESPIRATORY TRACT INFECTION

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Abstract

BACKGROUND : Acute respiratory tract infection (ARI) amounts to 69% of communicable diseases with 41,996,260 cases reported in the year 2018 in India. Acute upper respiratory infection (AURI) alone accounts for 85-88% of ARI cases globally and is one of the most common childhood illnesses with mostly an acute, self-limited course. The objective of the study was to identify the prevalence of viral AURI in paediatric age group of 2-12 years, identify the common causative viruses in the region of study and to correlate them clinically as a high volume of paediatric patients coming to the opd presented with symptoms of AURI.

METHODS : A cross-sectional out-patient department (OPD) based study was conducted in Basic emergency Obstetric and Newborn care services (BEmONC) centre in Adyar, Chennai for a short period from 16th September, 2022 to 24th September, 2022 with a total sample size of 65. Children in between the age group of 2 completed years to 12 completed years who presented to the OPD with symptoms of fever, cough and rhinorrhoea for a period of 5 days or more but less than 14 days suspected to be of viral etiology were included in the study. Demographic data, clinical features, basic blood reports were recorded. Oropharyngeal swabs were collected and were transported in Viral Transport Medium (3ml) . They were tested for Respiratory Syncytial Virus (RSV), Influenza, Parainfluenza, Adenovirus and Coronavirus by nucleic acid amplification. The results were statistically analysed .

RESULTS : A total of 65 children with URTIs were included. Majority (53.8%) were males and 2-5 years of age (63.1%). Common manifestations of URTI were fever (100%), cough (79%), rhinorrhoea (62%), pharyngitis (79%) and conjunctivitis (12.3%). None (100%) of them vaccinated for Flu vaccine. Oropharyngeal swabs showed 18.46% positivity for Influenza H1N1 and 31.3% for RSV. Majority (81.54%) of children were given supportive treatment and 18.46% received Oseltamivir. Antibiotics were started empirically in 27.69%. Most of children (76%) recovered within one week and 100% within two weeks. No children were hospitalized and children positive for HINI were isolated at home for 7 days. Complications or deaths did not occur.

CONCLUSION : Majority of URTIs in children resolved with supportive treatment and do not require antibiotics. Prevention of influenza infection through vaccination is the best strategy to reduce its disease burden and high rates of School absenteeism.

KEY MESSAGES : Acute upper respiratory tract infection, Respiratory Syncytial Virus, Influenza, Flu Vaccine

INTRODUCTION

Acute respiratory tract infection (ARI) amounts to 69% of communicable diseases with 41,996,260 cases reported in the year 2018 in India. ¹ It is a significant cause of under 5 Mortality in India and a cause of school absenteeism in school going children. ARI accounts for 20% for deaths in paediatric age group under 5 years of age of which 35-40% is due to neonatal pneumonia globally.² Acute upper respiratory infection (AURI) alone accounts for 85-88% of ARI cases globally.³

Acute upper respiratory infection (AURI) is a symptom cluster consisting of but not limited to sore throat, cough, low-grade fever, nasal congestion, running nose and malaise. It is the invasion of the upper respiratory tract mucosa, usually by bacteria and virus from inhaled infected droplets, overpowering the mechanical barriers of the innate immune system such as the epithelial cilia and the mucus layer result as well as the adenoids and tonsils cause inflammation and

irritation of mucosa resulting in this symptom complex.⁴ Viral causes of ARI predominantly include human respiratory syncytial virus (RSV), human rhinovirus, influenza virus (subtypes A and B), human parainfluenza, human adenovirus and human metapneumovirus.¹

The number of community-based studies done in India is significantly less despite the high volume of cases. This leads to a chain of problems such as antibiotic abuse, stagnancy of vaccination programs and many more.⁵

AIMS AND OBJECTIVES

The objective of the study was to identify the prevalence of viral AURI in paediatric age group of 2-12 years, identify



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the common causative viruses in the region of study and to correlate them clinically as a high volume of paediatric patients coming to the OPD presented with symptoms of AURI.

MATERIALS AND METHODS

STUDY TYPE : This study is a cross-sectional descriptive study.

STUDY AREA, STUDY POPULATION AND SAMPLE SIZE : A cross-sectional out-patient department (OPD) based study was conducted in Basic emergency obstetric and newborn care services (BEmONC) centre in Chennai, Tamil Nādu for a short period from 16th September, 2022 to 24th September, 2022. The sample size obtained was 65.

INCLUSION CRITERIA :

- Children in the age group of 2 to 12 years.
- Clinical presentation of fever, cough, rhinorrhea, myalgia and headache for a period of 5 days or more but less than 14 days.

EXCLUSION CRITERIA :

- Patients presenting with chronic lung disease, heart diseases, liver disease, kidney disease, pulmonary tuberculosis, pneumonia (clinically or radiologically confirmed)
- Patients tested positive for covid.

STUDY TOOL AND DATA COLLECTION : A pretested semi-structured questionnaire was used to interview the child's mother, who was the informant in the study. The data were collected from mothers of Children in between the age group of 2 to 12 years who presented to the OPD with symptoms of acute upper respiratory tract infection visiting the Basic emergency obstetric and newborn care services (BEmONC) Centre. Data were collected for a period of 9 days from 16th September 2022 to 24th September, 2022.

STUDY DESIGN : After obtaining relevant history and a performing a detailed clinical examination, throat swabs of the patients were obtained under aseptic conditions. The samples were transported in INSTA XPORT Viral Transport Medium (3ml). Swabs in VTM was shifted at 2°C-8°C on wet ice within a period of 6 hours from collection for testing. The samples were tested for Respiratory Syncytial Virus (RSV), Influenza, Para influenza, Adenovirus and Rhinovirus. The complete blood count and C-Reactive protein value reports of participants were collected.

STATISTICAL ANALYSIS : The data analysis was carried out using SPSS for Windows, version 17.0. Continuous variables were presented as mean +/- SD. Categorical variables were expressed as frequencies and percentages. The significance level was set at $P < 0.05$.

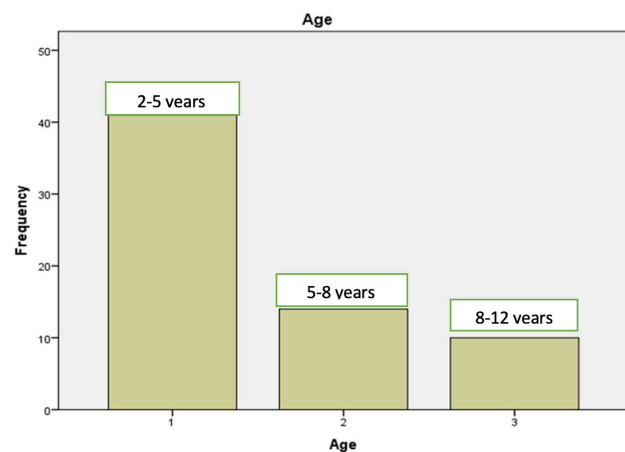
ETHICAL APPROVAL, INFORMED CONSENT, AND SUPPORT:

The study was carried out after obtaining approval from the Institutional Ethics Committee. The parents were briefed about the study, and informed consent was obtained before data collection. As part of the logistics support, the materials, manpower, and other resources required for conducting the study was provided by the institution.

RESULTS

A total of 65 children with URTIs were included. Majority (53.8%) were males and 2-5 years of age (63.1%). Common manifestations of URTI were fever (100%), cough (79%), rhinorrhoea (62%), pharyngitis (79%) and conjunctivitis (12.3%) (Figure 1). Only 1.5% had history of contact with URTI in a family member and none of them vaccinated for Flu vaccine.

Figure 1 : Agewise prevalence of AURI



Among the children studied 6.1% had auscultatory finding of crepitations or wheeze in chest. Among the blood investigations, CRP was positive in 16.9% of children (Figure 2).

Table 1 : Frequency of symptoms in AURI

Symptoms	Percentage (actual number of patients)
Fever	100% (65)
Cough	79% (51)
Sore throat/throat pain	79% (51)
Nasal discharge	62% (40)
Conjunctivitis	12.3% (8)
Ear ache/discharge	6.5% (4)

Oropharyngeal swabs showed 18.46% positivity for Influenza H1N1 and 31.3% for RSV (Figure 3).

Majority (81.54%) of children were given supportive treatment and 18.46% received Oseltamivir. Antibiotics were started empirically in 27.69%. Most of children (76%) recovered within one week and 100% within two weeks. No children were hospitalized and children positive for HINI were

isolated at home for 7 days. Complications or deaths did not occur.

Figure 2 : Prevalence of Positive CRP in AURI

key: 1- positive ; 2- negative

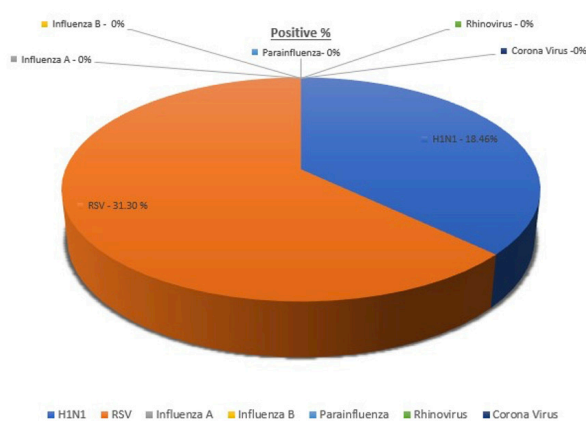
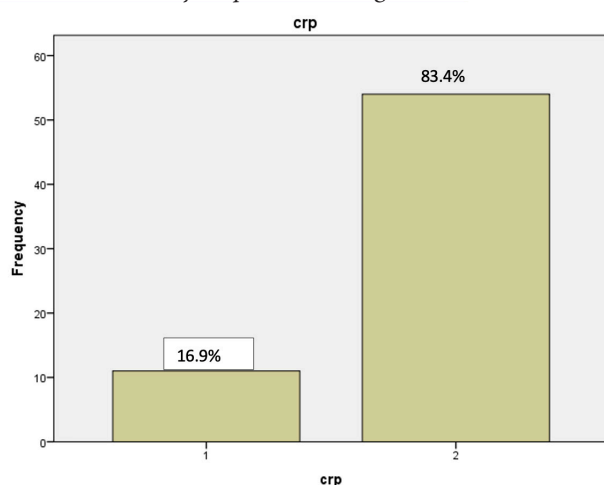


Figure 3: Pie chart representing the percentage of individual virus tested positive in study population

DISCUSSION

The study demonstrated higher proportion of boys (53.8%) was reported to have AURI when compared to girls (%). The association between gender and AURI is statistically significant. Various studies carried out by Choube et al., Prajapati et al., Goel et al., and Leeder et al. report that male children are more prone to ARI when compared to female children.^{6,7,8}

The probable reason that there is predominance among male children could be because of the tendency of male children to play outside home getting them exposed to infected aerosols from the surrounding outdoor environment as compared to female children.

In our study, children between the age group of 2-12 years were selected. Children below 2 years of age frequently suffer from bronchiolitis with RSV being the most common etiological agent detected in clinical practice. Children >12 years comprise small proportion of study population in our OPD, hence not included in our study. In our study, the most

common viruses detected were RSV followed by H1N1 Influenza. The age distribution of ARIs indicated that children under 3 years old were more likely to be infected by RSV confirmed the importance of RSV in children with ARIs, especially in children < 4 years of age.⁹⁻¹² Influenza virus is one of the major causative agents of respiratory disease in humans and may lead to serious illness.¹³ In temperate countries influenza outbreaks usually occur during the winter season.

With the introduction of molecular techniques, the detection of multiple co-infecting viruses has become common, though the prevalence of each virus varies between studies.¹⁴

Although our study didn't show any co-infection, previous reports suggest the incidence of viral co-infection in children can reach 30%.¹⁵ Co-infection is most often found in children under the age of 5, due to the immaturity of the immune system and, thus, greater susceptibility to infection.¹⁶

LIMITATIONS

Limitations of the study was convenient sampling. Due to diversity of population in different parts of India and their living conditions, it is difficult to generalize these findings. Further, quantification of other related risk variables like overcrowding, area of residence and nutrition status could not be included in our study due to feasibility constraints. Since our study was performed in a shorter duration, effect of seasonality could not be studied. Further longitudinal multicentric studies will help in identifying the association with risk factors.

CONCLUSION

- Majority of URTIs in children resolved with supportive treatment and do not require antibiotics. Antibiotic stewardship in simple URTIs should be practiced using awareness.
- Prevention of influenza infection through vaccination is the best strategy to reduce its disease burden and high rates of School absenteeism.
- The Flu Vaccination may also have a protective effect on the course of COVID-19 in the Paediatric Population.
- Such studies are important for the improvement and optimization of diagnostic tactics, as well as measures for the control and prevention of the respiratory viral infections.

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