

ORIGINAL RESEARCH

Evaluation of Influenza Virus Among Children with Acute Respiratory Infections at a Tertiary Care Hospital

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ABSTRACT

Background: Acute respiratory infections (ARIs) are classified as upper respiratory tract infections (URIs) or lower respiratory tract infections (LRIs). Influenza has an estimated annual attack rate of 5 to 10% in adults and 20 to 30% in children with severe respiratory illness in 3 to 5 million cases and half a million deaths globally. Hence; the present study was conducted for evaluation of influenza virus among children with acute respiratory infections.

Materials & Methods: A total of 200 children were enrolled. All the subjects belonged to the age range of 3 years to 15 years. Only those subjects were enrolled which presented with acute respiratory infections. Collection was nasal swabs was done using sterile flocced nylon swabs. Extraction of RNA was done using ELISA technique. Conversion of extracted RNA was done to cDNA. Influenza A virus was detected using PCR according to WHO protocol. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

Results: The mean age of the patients was 6.3 years. The most common symptoms observed among the patients with acute respiratory tract infection were cough (80%), rhinorrhea (66%) and nasal congestion (62%). The influenza A virus was detected in 30 (15%) samples, and 9 (4.5%) samples were positive for influenza B virus.

Conclusion: A significant proportion of children with ARI are affected by influenza virus with type A being more common.

Key words: Influenza, Virus, Respiratory.

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INTRODUCTION

Acute respiratory infections (ARIs) are classified as upper respiratory tract infections (URIs) or lower respiratory tract infections (LRIs). The upper respiratory tract consists of the airways from the nostrils to the vocal cords in the larynx, including the paranasal sinuses and the middle ear. The lower respiratory tract covers the continuation of the airways from the trachea and bronchi to the bronchioles and the alveoli. ARIs are not confined to the respiratory tract and have systemic effects because of possible extension of infection or microbial toxins, inflammation, and reduced lung function.¹⁻³

Infections of the respiratory tract are perhaps the most common human ailment. Although they are a source of discomfort, disability, and loss of time for most adults, they are a substantial cause of morbidity and mortality in young children. Acute respiratory infections (ARIs) are the single greatest cause of

death among children throughout the world.⁴⁻⁶ Influenza has an estimated annual attack rate of 5 to 10% in adults and 20 to 30% in children with severe respiratory illness in 3 to 5 million cases and half a million deaths globally.⁷ Influenza has an estimated annual attack rate of 5 to 10% in adults and 20 to 30% in children with severe respiratory illness in 3 to 5 million cases and half a million deaths globally.⁸ Hence; the present study was conducted for evaluation of influenza virus among children with acute respiratory infections.

MATERIALS & METHODS

A total of 200 children were enrolled. All the subjects belonged to the age range of 3 years to 15 years. Only those subjects were enrolled which presented with acute respiratory infections like cough, fever, sore throat, rhinorrhea, nasal congestion, headache, myalgia, wheezing and dyspnea. Collection was nasal

swabs was done using sterile flocculated nylon swabs. Extraction of RNA was done using ELISA technique. Conversion of extracted RNA was done to cDNA. Influenza A virus was detected using PCR according to WHO protocol. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

The mean age of the patients was 6.3 years. The most common symptoms observed among the patients with acute respiratory tract infection were cough (80%), rhinorrhea (66%) and nasal congestion (62%). The influenza A virus was detected in 30 (15%) samples, and 9 (4.5%) samples were positive for influenza B virus.

Table 1: Demographic data

Variable	Number	Percentage	
Age group (years)	3 to 8	66	33
	9 to 12	86	43
	13 to 15	48	24
Gender	Boys	145	72.5
	Girls	55	27.5

Table 2: Incidence of influenza virus

Influenza virus	Number	Percentage
Present	39	19.5
Absent	161	80.5
Total	200	100

DISCUSSION

It is proved that Influenza virus is a serious human pathogen that causes significant morbidity and mortality. Overall, it is annually reported that winter epidemics caused by these viruses affect the whole population worldwide. Consequently, they lead to some economic crises and to severe diseases and mortality. It is further estimated that about 9% of the world population is subject to these seasonal epidemics each year, which are reported to be responsible for about 3 to 5 million cases of serious diseases and 650,000 deaths yearly. Noticeably, it is detected that these cases are associated with respiratory illnesses due to seasonal influenza. The World Health Organization (WHO) estimates that 20 to 30% of children are infected with the influenza virus each year, causing 1 to 2 million cases of SARI and up to 100,000 deaths per year. Children are likely to be infected twice to three times more frequently than adults. In addition, young children, especially those under the age of six months, are at a higher risk of serious illnesses, hospitalization and death caused by influenza virus than older children. Furthermore, children under 5 years old play a critical role in the transmission of influenza in the community.⁹⁻¹¹ Hence; the present study was conducted for evaluation of influenza virus among children with acute respiratory infections.

A total of 200 children were enrolled. The mean age of the patients was 6.3 years. The most common symptoms observed among the patients with acute respiratory tract infection were cough (80%), rhinorrhea (66%) and nasal congestion (62%). The influenza A virus was detected in 30 (15%) samples, and 9 (4.5%) samples were positive for influenza B virus. Rafeek RAM et al described the clinical and epidemiological characteristics of Inf-V infections in

a sample of hospitalized children with ARI. Nasopharyngeal aspirates (NPA) from 500 children between 1 month to 5 years old with symptoms of ARI were collected. The Inf-V were then subtyped using a multiplex RT-PCR. Inf-V were detected in 10.75% (54/502) of the hospitalized children with ARI and in that 5.57% (28/502) were positive for Inf-A and 5.17% (26/502) were positive for Inf-B. Of the 54 Inf-V positive children, 33 were aged between 6 and 20 months. Of the 28 children infected with Inf-A, 15 had uncharacterized lower respiratory infection, 7 had bronchopneumonia and 6 had bronchiolitis. Of the 26 children infected with Inf-B, 11 had uncharacterized lower respiratory infection, 10 had bronchiolitis, and 4 had bronchopneumonia.¹² Silva PAN et al received and tested a total of 606 specimens. Rhinovirus virus was the viral type most prevalent, detected in 186 (45.47%) specimens. The age range of patients positive for influenza A, influenza A (H1N1), and influenza B was 18 days to 13 years. With female prevalence for this viral type, cough and asthma were the main clinical manifestations presented by this viral type. Our results indicate that rhinoviruses, adenoviruses, metapneumoviruses, and influenza are among the most important agents of ARI in pediatrics. The epidemic period of respiratory infections observed in Goiânia can be useful for planning and implementing some prevention strategies.¹³ Yoshihara K et al collected clinical-epidemiological information and nasopharyngeal swabs from ARI children hospitalized. In the pre-A/H1N1pdm09 period, influenza B-associated ARI hospitalization incidence among children under five was low, ranging between 14.7 and 80.7 per 100 000 population. The incidence increased to between 51.4 and 330 in the post-A/H1N1pdm09. Influenza B ARI cases were

slightly older with milder symptoms. Both Victoria and Yamagata lineages were detected before the A/H1N1pdm09 outbreak; however, Victoria lineage became predominant in 2010-2013 (84% Victoria vs 16% Yamagata). Victoria and Yamagata lineages did not differ in demographic and clinical characteristics. In Victoria lineage, Group1 ARI cases were clinically more severe compared to Group5, presenting a greater proportion of wheeze, tachypnea, and lower respiratory tract infection. The results highlighted the increased incidence of influenza B-related ARI hospitalization among children.¹⁴

CONCLUSION

A significant proportion of children with ARI are affected by influenza virus with type A being more common.

REFERENCES

1. Addo-Yobo E., Chisaka N., Hassan M., Hibberd P., Lozano J. M., Jeena P. et al. Oral Amoxicillin versus Injectable Penicillin for Severe Pneumonia in Children Aged 3 to 59 Months: A Randomised Multicentre Equivalency Study. *Lancet*. 2004;364(9440):1141–48.
2. Adegbola R. A., Falade A. G., Sam B. E., Aidoo M., Baldeh I., Hazlett D. et al. The Etiology of Pneumonia in Malnourished and Well-Nourished Gambian Children. *Pediatric Infectious Disease Journal*. 1994;13(11):975–82.
3. Adegbola R. A., Usen S. O., Weber M., Lloyd-Evans N., Jobe K., Mulholland K. et al. Haemophilus influenzae Type B Meningitis in The Gambia after Introduction of a Conjugate Vaccine. *Lancet*. 1999;354(9184):1091–92.
4. World Health Organization. Information for Molecular Diagnosis of Influenza Virus – Update. Available from: http://www.who.int/influenza/gisrs_laboratory/molecular_diagnosis_influenza_virus_humans_update_201403.pdf. Accessed May 22, 2018.
5. Rahman MM, Rahman AM. Prevalence of acute respiratory tract infection and its risk factors in under-five children. *Bangladesh Med ResCounc Bull*. 1997;23:47–50.
6. Sebastian SR. Epidemiology of acute respiratory infections among under-fives in a rural community of Trivandrum district, Kerala. *Int J Community Med Public Health*. 2018;5:3459–63.
7. Arun A, Gupta P, Sachan B, Srivastava JP. Study on prevalence of acute respiratory tract infections (ARI) in under-five children in Lucknow district. *Natl J Med Res*. 2014;4:298–302.
8. Kartasmita CB, Demedts M. Risk factors for acute respiratory infections in under-five children. *Paediatr Indones*. 1995;35:65–77.
9. Bouzid D, Mullaert J, Le Hingrat Q, et al. Characteristics associated with COVID-19 or other respiratory viruses' infections at a single-center emergency department. *PLoS One*. 2020;15(12):e0243261.
10. Jroundi I, Benmessaoud R, Mahraoui C, et al. Antibiotic usage prior and during hospitalization for clinical severe pneumonia in children under five years of age in Rabat, Morocco. *Antibiotics*. 2013;2(4):450–464.
11. Bansal A, Trieu MC, Mohn KGI, Cox RJ. Safety, Immunogenicity, Efficacy and Effectiveness of inactivated influenza vaccines in healthy pregnant women and children under 5 years: an evidence-based clinical review. *Front Immunol*. 2021;12:3926.
12. Rafeek RAM, Divarathna MVM, Morel AJ, Noordeen F. Clinical and epidemiological characteristics of influenza virus infection in hospitalized children with acute respiratory infections in Sri Lanka. *PLoS One*. 2022;17(9):e0272415.
13. Silva PAN, Ito CRM, Moreira ALE, et al. Influenza and other respiratory viruses in children: prevalence and clinical features. *Eur J Clin Microbiol Infect Dis*. 2022;41(12):1445–49.
14. Yoshihara K, Le MN, Toizumi M, et al. Influenza B associated paediatric acute respiratory infection hospitalization in central Vietnam. *Influenza Other Respir Viruses*. 2019;13(3):248–61. doi:10.1111/irv.12626