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Original Research Article

MOLECULAR DETECTION AND CLINICAL PROFILE OF INFLUENZA VIRUS AMONG THE PEDIATRIC POPULATION IN A TERTIARY CARE HOSPITAL IN KARNATAKA.

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ABSTRACT

The study aimed to determine the positivity and common clinical features of the influenza virus among hospitalized pediatric patients. The investigation was conducted from December 2022 to November 2023, during which 310 nasopharyngeal swabs were collected from pediatric patients admitted with acute respiratory symptoms (categorized as Category C according to the Ministry of Health and Family Welfare, MOHFW guidelines). These samples were processed following standard protocols. Viral RNA was extracted, and real-time reverse transcriptase polymerase chain reaction (r RT-PCR) was performed to detect the presence of the influenza virus. Subsequent r RT-PCR assays were conducted for subtyping influenza virus types A and B. The clinical histories of the patients were also documented.

Out of the 310 samples, 23 (7.42%) tested positive for influenza virus A or B. Further subtyping revealed that 03/310 (0.97%) were positive for A H1N1, 17/310 (5.48%) were positive for A H3N2, and 03/310 (0.97%) were positive for B Victoria. Among the positive influenza cases, fever was the most prominent clinical feature observed in all patients. Other common clinical symptoms included cough, breathlessness, and sore throat.

The findings underscored the importance of early detection, prompt treatment, and effective management of complications to reduce the burden of influenza epidemics. At the public health level, the study highlighted the need for continuous surveillance to monitor any resurgence of the infection that could potentially lead to further epidemics or pandemics. The unpredictable nature of influenza virus evolution continues to pose challenges to vaccine strategies and pandemic preparedness, emphasizing the importance of ongoing research and vigilance in addressing this significant health threat.

Keywords: RT PCR, Influenza, H1N1, H3N2, Nasopharyngeal swab, respiratory illness.

INTRODUCTION

Influenza viruses are the members of Orthomyxoviridae family. They are one of the major causes of morbidity and mortality and have been responsible for several epidemics and pandemics of respiratory diseases. They consist of- Influenza A, B, C and D.[1] Influenza viruses always had potential to cause widespread pandemics whenever a new type of Influenza strain appeared in the human population and then spread easily from person to person.[2] The modern history of the disease may be considered to date from the pandemic of 1889-90 during which Pfeiffer isolated

Haemophilus influenzae and claimed that it was the causative agent. The most severe pandemic occurred in 1918-19, when it was shown that Pfeiffer's bacillus was not the primary cause of the disease, though it act as a secondary invader. The influenza virus was isolated in 1933 by Smith, Andrewes and Laidlaw- a milestone in the development of medical virology.[3] In the typical clinical disease, onset is abrupt, with fever, headache and generalized myalgia. Respiratory symptoms are prominent and severe prostration is common. The uncomplicated disease resolves within about seven days. The most important complication is pneumonia. Cardiac complications, such as congestive failure or myocarditis and neurological involvement, such as encephalitis, may occur rarely.[4] Though children are mainly affected during epidemics, the viruses are also responsible for substantial mortality in the aged and chronically ill persons. Influenza like illness (ILI) screening and surveillance program are critical in tracking the activity of influenza viruses across seasons.[5] This study was however restricted only to category C pediatric patients, to know the positivity of influenza viruses among them, as well as to study the common clinical features in influenza positive cases. Early interventions may result in better outcomes in terms of reduced requirement of invasive ventilation and decreased mortality rate.[6]

Objectives: The present study was conducted to determine the positivity of influenza viruses in category-C pediatric patients as per MOHFW guidelines and to study the common clinical features in laboratory confirmed cases of influenza.

MATERIALS AND METHODS

The present study was conducted at Virus Research and Diagnostic Laboratory (VRDL), Department of Microbiology, KMCRI, Hubballi. The study population included influenza suspected pediatric patients (only category-C as per MOHFW guidelines on Influenza testing) [7] admitted in Department of Pediatrics who were tested for Influenza during December 2022 to November 2023 (one year).

A total of 310 nasopharyngeal swabs were collected from these admitted pediatric patients. Patients' details and clinical history were also recorded. The collected swabs were sent to VRDL in a viral transport medium (VTM) as per the standard guidelines.

The viral RNA was extracted from clinical samples using the spin column based QAI amp Viral RNA mini kit as per the manufacturer's instructions.

A real time reverse transcriptase Polymerase Chain Reaction (r RT PCR) was performed to detect influenza virus as per ICMR-NIV protocol.

Another r RT PCR was performed for subtyping type A/B influenza virus.

RESULTS

A total of 310 nasopharyngeal swabs were processed over a period of one year. Out of these 310 cases, 188 were under the age of one year, 65 were between one to two years of age, 29 were in the age group of two to five years and 28 were more than five years of age. The age wise distribution is depicted in table-1. [Table 1]

Out of 310 cases, 190 were males and 120 were females. The gender wise distribution is as depicted in table-2. [Table 2]

Out of 310 samples processed by r RT PCR, a total of 23 (7.42%) were positive for influenza virus A/B. Further subtyping results showed that 03/310 (0.97%) were positive for A (H1N1). 17/310 (5.48%) were positive for A (H3N2) and 03/310 (0.97%) were positive for B (Victoria). The positivity is depicted in table-3. [Table 3]

Fever was the common clinical feature in all the lab confirmed cases of influenza, 23/23 (100%). Cough was present in 16/23 (69.57%) cases, breathlessness was present in 09/23 (39.13%) while sore throat was noted in only 06 out of 23 (20.09%) of the lab confirmed influenza cases.

Table 1: Age Wise Distribution

S. No.	Age group	No. of patients tested	Positives (%)
1.	< 1 year	188	08 (4.26%)
2.	>1 to <2 years	65	06 (9.23%)
3.	>2 to <5 years	29	07 (24.13%)
4.	> 5 years	28	02 (7.14%)
5.	Total	310	23 (7.42%)

Table 2: Gender Wise Distribution

S. No.	Gender	Samples tested	Positives (%)
1.	Male	190	14 (7.37%)
2.	Female	120	09 (7.5%)
3.	Total	310	23 (7.42%)

Table 3: Influenza Subtypes Distribution

S. No.	Type and Subtype of Influenza	No. of Positives	Percentage
1.	Influenza A (H1N1)	03/310	0.97%
2.	Influenza A (H3N2)	17/310	5.48%
3.	Influenza B (Victoria)	03/310	0.97%

4.	Influenza B (Yamagata)	0/310	0%
5.	**TOTAL**	**23/310**	**7.42%**

DISCUSSION

The study reveals the positivity of influenza among the hospitalized pediatric patients (category- C) and common clinical features of influenza among them. 7.42% of the samples were positive for influenza virus A/B. A study done by Mahantesh S *et al*,[8] on incidence of H1N1 in pediatric population found 34.8% patients to be positive for influenza A H1N1. Another study done by S Roy *et al*,[5] on prevalence of influenza virus among the pediatric population in Mumbai found that 11% samples were positive for influenza virus.

In our study, fever followed by cough was found to be the most common clinical features in lab confirmed influenza cases. This finding was consistent with studies done all over the world.[9,11,12,13] Other common clinical features were breathlessness/hurried breathing and sore throat.

Continuous monitoring of influenza viruses is required for early detection of any antigenic variants, to understand the seasonality and analyze factors such as temperature, rainfall and humidity in the transmission of influenza viruses.[5] A continuous surveillance system will also help in detecting any kind of changes at the earliest and thus help in informing the public health response. Such studies also contribute towards anticipating a pandemic and updating the influenza vaccines annually.

A knowledge about the common clinical manifestations of influenza virus in pediatric age group helps in keeping a high degree of suspicion and early interventions may result in better outcomes in terms of reduced requirement of invasive ventilation and decreased mortality rate. The cases should be categorized, tested and treated as per the MOHFW guidelines.[7] The infection prevention and control strategies must be stringently followed. General measures should be stressed upon, such as educating people about hygiene and cleanliness, distancing, adequate room ventilation and use of masks for those in close contact with patients with respiratory illness.[9] Prompt treatment and management of the complications go a long way in curtailing the recurrence of this epidemic. At the public health level, continuous surveillance for any resurgence of the infection causing further epidemics/pandemics should be done.[10]

CONCLUSION

The study demonstrated a 7.42% positivity rate for influenza virus A/B among hospitalized pediatric patients, with the A (H3N2) subtype being the most prevalent. Fever and cough were the most common clinical features observed. The findings emphasize the importance of early detection, prompt treatment, and continuous surveillance to manage and mitigate the impact of influenza in pediatric populations.

Limitations

The study was limited to a single tertiary care hospital, which may not be representative of broader regional or national trends. Additionally, only Category-C pediatric patients were included, potentially overlooking milder cases of influenza.

Recommendations

To mitigate the impact of influenza and to enhance its management, it is recommended to establish and strengthen a wider and continuous surveillance network to include broader demographic and geographic areas so as to ensure rapid detection and control of outbreaks, and adoption of appropriate health measures. A continuous and broader surveillance network will also contribute towards monitoring the trends and hence updating the vaccines annually. Public health efforts should focus on early detection, education on preventive measures, and strict adherence to infection control strategies.

REFERENCES

1. Myxovirus and Rubella Virus. In: Sastry AS, Bhat S, editors. Essentials of Medical Microbiology. 2nd ed. India: Jaypee Brothers; 2019. p. 474.
2. Siddharth V, Goyal V, Koushal VK. Clinical-Epidemiological Profile of Influenza A H1N1 Cases at a Tertiary Care Institute of India. Indian J of Community Medicine. 2012; 37(4): 232-5.
3. Orthomyxoviruses. In: Ananthanarayan R, Paniker CKJ, editors. Ananthanarayan and Paniker's Textbook of Microbiology. 10th ed. India: Universities Press; 2017. p. 502.
4. Orthomyxoviruses. In: Ananthanarayan R, Paniker CKJ, editors. Ananthanarayan and Paniker's Textbook of Microbiology. 10th ed. India: Universities Press; 2017. p. 506
5. Roy S, Patil D, Dahake R, Mukherjee S, Athlekar SV, Deshmukh RA, Chowdhary A. Prevalence of influenza virus among the pediatric population in Mumbai during 2007-2009. Indian J of Med Microbiol. 2012; 30(2): 155-8.
6. Agarwal R, Patidar H, Jain R, Akhani P. Clinical Profile and Detection of Novel H1N1 Influenza Virus in Children by Reverse Transcription Polymerase Chain Reaction at a Tertiary Care Center. J of Med Sci and Health. 2021; 7 (2): 39-42.
7. Ministry of Health & Family Welfare. Seasonal Influenza. Guidelines on categorization of seasonal influenza cases during screening for home isolation, testing, treatment and hospitalization (25.02.2019).
8. S Mahantesh, S Manasa. Incidence of H1N1 in pediatric population in a tertiary care hospital in Bangalore. Trop J Path Micro. 2017; 3(3): 266-71.
9. Gupta BD, Purohit A. A Clinical Study of Hospitalized H1N1 Infected Children in Western Rajasthan. J of Tropical Pediatrics. 2011; 57(2): 87-90.
10. Bai KV, Rani PJ, Raju MS. A Study on H1N1 Case in Pediatrics Department of GGH/GMC, Guntur. International J of Contemporary Medical Research. 2019; 6(6): F16-F18.
11. Libster R, Bugna J, Coviello S etal. Pediatric hospitalizations associated with 2009 Pandemic Influenza A (H1N1) in Argentina. N Engl J Med. 2010; 362: 45-55.
12. Lessler J, Reich NG. Cummings DAT and the New York City Department of Health and Mental Hygiene Swine Influenza Investigation Team. Outbreak of 2009 Pandemic Influenza A (H1N1) at a New York City School. N Engl J Med. 2009; 361: 2628-36.
13. Cauchemez S, Donnelly CA, Reed C et al. Household transmission of 2009 Pandemic Influenza A (H1N1) Virus in the United States. N Engl J Med. 2009; 361: 2619-27.