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Case Series

Profile of adenoviral infection in hospitalized children

Sanjeev Dutta, Niharika Khullar*

Department of Pediatrics, Marengo Asia Hospital, Faridabad, Haryana, India

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***Correspondence:**
Dr. Niharika Khullar,
E-mail: niharika.khullar1992@gmail.com

ABSTRACT

This single-center, retrospective study was conducted at Marengo Asia Hospital, Haryana from January 2023 to November 2023. Children aged 1 month to 16 years, admitted with a positive adenovirus polymerase chain reaction (nasopharyngeal swab) were included. Symptomatic management was provided to all children. The study focuses on discussing the demographic, clinical, laboratory and radiological profiles of hospitalized children with human adenovirus infection. Among the 25 children with a positive adenovirus polymerase chain reaction, 18 (72%) were males, 15 (60%) were within the age group of 1 month to 5 years. Furthermore, 13 (52%) children were hospitalized during summer season. The most prevalent symptoms observed in children admitted with adenovirus infection were high-grade persistent fever in 25 cases (100%), cough and cold in 15 cases (60%), 14 (56%) vomiting in 14 cases (56%), pain abdomen and loose stools in 10 cases (40%), conjunctivitis in 6 cases (24%), and adenoviral pneumonia in 4 cases (16%). Notably all children were discharged successfully without encountering any complications. HAdV infections are commonly associated with high- grade fever, challenging the conventional perception that respiratory infections are their predominant manifestation. Equally noteworthy is the prevalence of gastrointestinal symptoms in HAdV infections

Keywords: Human adenoviruses, Polymerase chain reaction, C-reactive protein

INTRODUCTION

Human adenoviruses (HAdVs), name derived from its initial isolation from human adenoids in 1953, is known to cause febrile illness and many symptoms ranging from common cold to pneumonia, conjunctivitis, gastroenteritis, cardiomyopathy, meningoencephalitis.[1] HAdVs have a predilection for pediatric population younger than 5 years because they spend a significant portion of their days in closed environments such as daycare centers, orphanages, or other institutions.[2]

CASE SERIES

This retrospective single-center study was conducted at the department of pediatrics, Marengo Asia Hospitals, a pediatric tertiary care center in Faridabad, Haryana, India. The electronic database of the department was reviewed for patients admitted between January 1, 2023 to November 30, 2023, within the age range of 1 month to 16 years, diagnosed with HAdVs infections. Total of 25 patients were included in this study who were diagnosed with HAdVs infections. The objective was to describe the demographic, clinical, laboratory and radiological profile of these cases. Confirmation of HadV infections occurred during the hospital stay, using the nasopharyngeal swab Real-Time PCR test: Respiratory Panel 5 (Respiratory syncytial virus A/B, cytomegalovirus, enterovirus/ parechovirus, adenovirus).

Respiratory panel 5 is a non-invasive test that can be done using a nasal swab or throat swab. The sample is sent to laboratory for analysis. This test uses a molecular diagnostic technique, such as a polymerase chain reaction (PCR), to detect the presence of five respiratory pathogens. This test is highly accurate. The

nasopharyngeal swab specimens were collected by trained medical professionals and test was performed, and reported in 4 days. Results observed were the study identified a total of 25 children with HAdV infections. Among them, 18 (72%) were male children, and 15 (60%) were between 1 month to 5 years of age. Additionally, 13 (52%) cases were reported during summer season (Table 1). Clinical Parameters: All the children included in the study were immunocompetent and presented with persistent fever lasting for more than 5 days. Among them,15 cases (60%) exhibited cough, 14 cases (56%) had vomiting, and 10 cases (40%) experienced. Additionally, pain abdomen and loose stools were reported in 10 cases (40% for both), sore throat was reported in 9 (36%) cases, conjunctivitis was reported in 6 cases (24%).

Table 1: Demographic characteristics of patients with HAdV infection (n=25).

Parameters	N	%
Age		
1 month-5 years	15	60
>5 years	10	40
Sex		
Male	18	72
Female	7	28
Season		
Summer	13	52
Spring	10	40
Autumn	2	8
Winter	0	0

Table 2: Clinical characteristics of patients with HAdV infections (n=25).

Clinical parameters	N	%
Fever	25	100
Fever defervescense		
(< 5 days)	0	
(>5 days)	25	100
Lethargy	16	64
Cough	15	60
Vomiting	14	56
Loose stool	10	40
Sore throat/pharnygitis	9	36
Pneumonia	4	16
Conjunctivitis	6	24
Irritability	6	24
Lymphadenopathy	3	12

Pneumonia was diagnosed in 4 cases (16%), all of which had normal oxygen saturation (SpO2). Furthermore, lymphadenopathy was identified in 3 cases (12%) and 6 cases (24%) exhibited symptoms of irritability. Notably, none of the patients in our study developed severe HAdV infections, including hepatitis, myocarditis, meningoencephalitis and none required intensive care or mechanical ventilation (Table 2). Laboratory Parameters: In 7 cases (28%), a haemoglobin level of <10 g/dl was observed. A high total leukocyte count was high in 5 cases (20%), while neutrophilic predominance was evident in 16 cases (64%). C-Reactive Protein (CRP) were elevated in 20 cases (80%) and notably high in 4 (16%) cases. Despite this, blood culture remained negative in all cases (Table 3).

Table 3: Laboratory characteristics of patients with HAdV infection (n=25).

Laboratory parameter	N	%
Haemoglobin (g/dl)		
<10	7	28
>10	18	72
TLC (/mm3)		
<4000	1	4
4000-15,000	19	76
>15,000	5	20
DLC (%)		
Neutrophilic predominance	16	64
Lymphocytic predominance	9	36
Platelets (l/mm3)		
<1.5	2	8
1.5-4.5	20	80
>4.5	3	12
CRP (mg/dl)		
<5	1	4
5-100	20	80
>100	4	16
SGOT (U/l)		
<40	24	96
>40	1	4
SGPT (U/l)		
<40	24	96
>40	1	4
Blood culture		
Positive	0	
Negative	25	100
Flu PCR		
Positive	0	
Negative	25	100

Table 4: Radiological characteristics of patients with HAdV infection (n=25).

Parameters	N	%
Chest X-ray		
Not done	10	40
Bilateral patchy opacity	11	44
Consolidation	4	16
USG Whole Abdomen		
Not done	3	12
Mesenteric lymphnodes	14	56
Free fluid	4	16
Organomegaly	4	16

Radiological parameters: Chest X-ray were conducted on 15 patients based on their clinical profile upon admission. Bilateral patchy opacities were observed in 11 cases (44%), while consolidation was evident in 4 cases (16%). Ultrasound Whole Abdomen was performed on 22 patients revealing mesenteric lymphadenitis in 14 case (56%) and the presence of free fluid and organomegaly in 4 cases (16%) each (Table 4).

DISCUSSION

This study examined the demographic characteristics and clinical presentations of adenovirus infection in pediatric patients. In our study, children under 5 years of age were affected more which was consistent with Shachor et al and Zhou et al possibly due to the closed environment in which they live.[3,4] Male children were affected more as compared to female children which was consistent with studies conducted in Malaysia by Lim et al Brazil by Elenice et al and Taiwan by Chen et al there can be a potential gender predisposition to certain viral infections which needs to be studied.[4-7] The seasonal variation observed, with a majority of admissions occurring during the summer months, warrants consideration. Adenovirus infections, often associated with respiratory and gastrointestinal symptoms, might exhibit a seasonal pattern influenced by environmental factors or increased social interactions during specific times of the year. All of children in our study presented with fever which was consistent with study conducted by Rajbanshi et al however 60% had cough where as a study conducted by Ptak et al showed all patients had cough.[8,9] In our study leukocytosis was seen in 20% of children which was consistent with Chen et al 23.8% showed leukocytosis and raised CRP in 80% of children which was consistent with Rajbanshi et al in that study raised CRP was seen in 67% cases.[7,8] Liver enzymes were deranged in of cases 4% cases which was consistent with study conducted in Taiwan by Chen et al.[7] Previous studies have not documented any correlation between the radiological abnormalities in children with HadV and its various serotype. In our study chest X-ray showed bilateral patchy opacity in 44% cases and ultrasound whole abdomen showed mesenteric lymphadenitis in 56% cases.

In conclusion in our experience, HAdV infections are commonly associated with high- grade fever, challenging the conventional perception that respiratory infections are their predominant manifestation. Equally noteworthy is the prevalence of gastrointestinal symptoms in HAdV infections. Timely access to diagnostic testing plays a pivotal role in accurate diagnosis mitigating the unwarranted prescription of antibiotics. Notably, the clinical resemblance of HAdV illnesses to bacterial infections underscores the importance of early diagnosis, facilitating appropriate treatment modalities. This study contributes essential data regarding the clinical profile of adenovirus infections in hospitalized children. The detailed analysis of demographic, clinical, laboratory, and radiological parametres provides a comprehensive understanding of the manifestations associated with adenovirus infection in children.

Limitations

An important limitation of our study lies in the absence of serotype analysis of HAdV strains identified. As a result, we were unable to establish a direct association between specific HAdV serotypes and their respective clinical presentations.

CONCLUSION

The findings of this study can serve as a valuable reference for clinicians, aiding in the prompt recognition and management of adenovirus infections in pediatric patients. In cases of prolonged fever with multiple systemic signs especially gastrointestinal, HAdV should be considered as a differential diagnosis Furthermore, the data generated can guide future research endeavors, potentially prompting larger scale studies or longitudinal investigations to explore serotype-specific associations, treatment modalities, or predictive markers for severe complications.

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