Epidemiology and clinical characteristics of Human adenovirus in Korean children over the past 12 years (2008-2019)

Bin Ahn, Seungha Song, Ye Kyung Kim, Ki Wook Yun, Eun Hwa Choi
Department of Pediatrics, Seoul National University Hospital, Seoul, Korea

+82-10-4624-4304
ahnnybinny@gmail.com

Background

Human adenovirus (HAdV) is a common cause of respiratory tract infection (RTI) and clinical presentation varies by serotype. Serotypes 7 and 55 caused severe pneumonia in children during the early 2000s and in soldiers from 2014 to 2018, respectively, in South Korea. Recent data for the epidemiologic and clinical features of HAdV in Korean children are scarce.

Methods

Nasal aspirates were collected from patients aged 18 years or younger with suspected RTIs at Seoul National University Children's Hospital from 2008 to 2019. HAdV serotype was determined by partial sequencing of hexon gene. The demographics and clinical features were reviewed through medical records

Results

Table 1. Characteristics of 186 patients with HAdV infection

Clinical Parameters	
Sex (n [%])	
Male	113 (60.8)
Median age (range) (y)	2.1 (0.1-17.9)
Clinical diagnosis (n [%])	
Upper respiratory infection	65 (34.9)
Bronchiolitis/Bronchitis	15 (8.1)
Pneumonia	73 (39.2)
Simple Febrile illness	33 (17.7)
Underlying disease (n [%])	
Yes	95 (51.1)
Neurology	22 (11.8)
Immunocompromised	12 (6.5)
Cardiology	10 (5.4)
Preterm	10 (5.4)
Others	41 (22.0)
No	91 (48.9)

Serotype (n [%])		
A31	2 (1.1)	
B03	73 (39.2)	1
B07	1 (0.5)	
B35	2 (1.1)	
B55	9 (4.8)	
C01	31 (16.7)	
C02	42 (22.6)	2
C05	8 (4.3)	
C06	7 (3.8)	
E04	11 (5.9)	

- Ten different serotypes were identified, which included 1-7, 31, 34, 35, and 55. The most predominant serotype was HAdV-3 (n=73, 39.3%) followed by HAdV-2 (n=42, 22.6%).

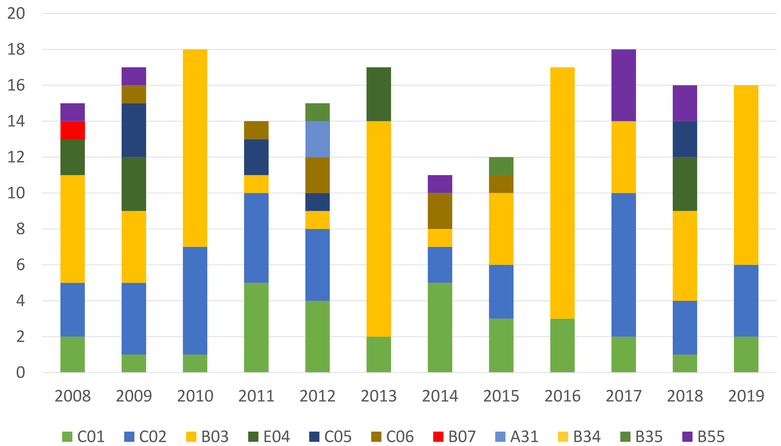

Figure 1. Serotype distribution of Adenovirus over 12 years

- HAdV-3 showed an epidemic every three years. HAdV-7 which previously caused severe pneumonia, has not been detected since 2008. HAdV-55 (n=9, 4.9%) was sporadically detected by each one case in 2008, 2009, and 2014, while six cases were detected in 2017-18.

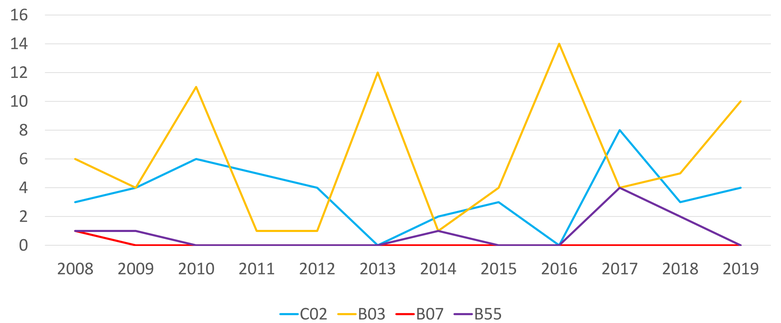

Figure 2. Annual distribution of AdV type 2,3,7, and 55

- Lower RTI was common in children infected with HAdV-3 (n=40, 54.8%) and HAdV-2 (n=18, 42.9%). Among children with HAdV-55 detected, most (66.7%) had upper RTI as clinical diagnosis and only two (22.2%) had a clinically considerable pneumonia.

	HAdV type			*P*
Characteristic	HAdV-3 (n=73)	HAdV-2 (n=42)	HAdV-55 (n=9)	
Age, Y, mean±SD	3.1 ± 2.4	2.3 ± 1.5	4.9 ± 3.3	**0.005**†
Signs and symtoms, n (%)				
Fever ≥ 5d	51 (69.9)	24 (57.1)	7 (77.8)	0.278
Nausea/vomiting	12 (16.4)	8 (19.0)	1 (11.1)	0.841
Respiratory difficulty	11 (15.1)	5 (11.9)	2 (22.2)	0.714
Conjunctival injection	18 (24.7)	2 (4.8)	1 (11.1)	**0.022***
Laboratory findings, mean±SD				
Leukocyte count, x10^3 cells/μl	11.94 ± 5.52	14.12 ± 6.00	8.26 ± 6.95	**0.016**
C-reactive protein, mg/dL	5.8 ± 5.6	5.6 ± 5.2	3.0 ± 2.8	0.314
Radiologic findings, n (%)				
Lobar infiltration	18 (24.7)	10 (23.8)	1 (11.1)	0.616
Perihilar infiltration	16 (21.9)	5 (11.9)	1 (11.1)	0.349
Pleural effusion	4 (5.5)	1 (2.4)	1 (11.1)	0.484
Clinical diagnosis, n (%)				
Upper respiratory infection	20 (27.0)	16 (38.1)	6 (66.7)	**0.050**§
Lower respiratory infection	40 (54.8)	18 (42.9)	2 (22.2)	0.126
Clinical outcome, n (%)				
Admission to ICU	4 (5.5)	2 (4.8)	1 (11.1)	0.728
Length of stay, d, mean±SD	11.3 ± 22.9	12.4 ± 15.1	11.5 ± 10.0	0.872

Bold-faced values indicate *P*-value <0.05
† *P*<0.05 between HAdV-2 and 55
* *P*<0.05 between HAdV-3 and 22
§ *P*<0.05 between HAdV-2 and 55

Table 2. Comparison of demographic and clinical features of children with respiratory infection by HAdV serotype.

Conclusion

Over the past 12 years, HAdV-3 and 2 were prevalent and played an important role in RTIs of Korean children. HAdV-55 infection in children was not clinically significant in comparison to the recent Korean military outbreak cases