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Epidemiology and Clinical Characteristics of Parainfluenza Virus Type 4 in Korean Children: A single center study, 2015-2017

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BACKGROUND

Human parainfluenza viruses (HPIVs) are among the most common causes of respiratory tract infections in children. Four HPIV types have been identified. Most studies of HPIVs have focused primarily on types 1-3. Owing to the difficulties of cell culture isolation and its absence from the routine panels of respiratory virus antigen detection in most clinical virology laboratories, little is known about the epidemiology and clinical characteristics of HPIV type 4.

OBJECTIVES

This study was performed to identify the epidemiology and the clinical characteristics of human parainfluenza virus type 4 (HPIV-4) infection compared to HPIVs 1-3 infections in Korean children.

METHODS

Subject

- Patients < 18 years of age who visited Seoul National University Children's Hospital with respiratory symptoms between January 2015 and December 2017.
- Patients with parainfluenza virus detected by multiplex reverse transcription polymerase chain reaction from nasopharyngeal aspiration.
- Patents who had underlying medical conditions such as chronic respiratory disease, immunodeficiency, congenital heart disease, neuromuscular disease or concurrent viral infections were excluded.

Virus detection

- Multiplex real-time RT PCR
- 01/2015~11/2015: Seeplex RV12 ACE detection kit (SeeGene, Seoul, Korea)
- 12/2015~12/2017: Anyplex Ⅱ RV16 detection kit (SeeGene, Seoul, Korea)

RESULTS

Epidemiology

- Of 12,539 samples, 472 (6.5%) were positive for HPIVs
- HPIV-1 87 (18.4%), HPIV-2 88 (18.6%), HPIV-3 180 (38.1%), HPIV-4 117 (24.8%)

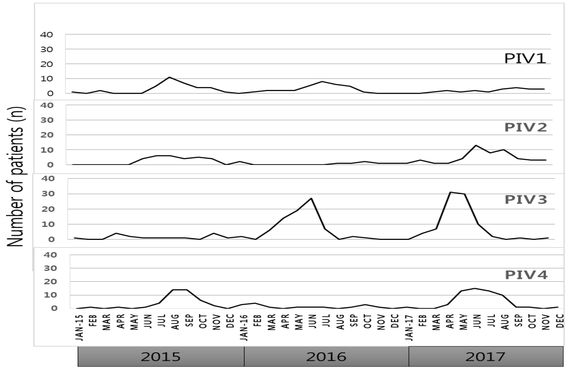

Figure 1. Epidemic pattern of parainfluenza virus 1-4 infections, 2015-2017

- HPIV-4 was prevalent in August to September in 2015 and in June 2017

Co-infections

- Rhinovirus was the most common virus in all cases

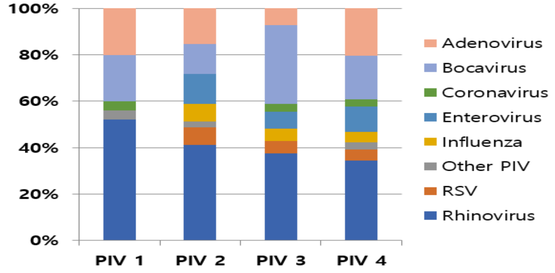

Figure 2. The distribution of co-detected respiratory viruses according to HPIV 1-4

Demographics

- The median age of children with HPIV-4 infection was 11 (0-195) months
- The proportion of HPIV-4 infected children aged <2 years and 2 to < 5 years were 65.4% and 19.2%

Clinical diagnosis

- Clinical diagnosis of HPIV-4 infection were bronchiolitis (38.5%), pneumonia (30.8%) and URI (30.8%)
- HPIV-4 infection was more often diagnosed as bronchiolitis (38.5%) compared to HPIV-1 (12.5%; *P*=0.037) and -2 (10.5%; *P*=0.036)
- Croup was the most prevalent in HPIV-2 (21.2%) and none in HPIV-4 infection (*P*=0.026)

Table 1. Comparison of Clinical Diagnosis of Parainfluenza Virus 1-4 Infections

Characteristic	HPIV-1 (n= 24)	HPIV-2 (n = 19)	HPIV-3 (n = 39)	HPIV-4 (n = 26)	P value
Diagnosis					
Febrile illness	1 (4.2)	2 (10.5)	0	0	> 0.05
URI	11 (45.8)	5 (26.3)	7 (17.9)	8 (30.8)	> 0.05
Croup	3 (12.5)	4 (21.1)	2 (5.1)	0	< 0.05*
Bronchiolitis	3 (12.5)	2 (10.5)	21 (53.8)	10 (38.5)	< 0.05†
Pneumonia	6 (25.0)	6 (31.6)	9 (23.1)	8 (30.8)	> 0.05

NOTE. Data are no. (%) of patients, unless otherwise indicated.
Patients with underlying disease and combined infection were excluded.
* Percentages of Croup were significantly different; *P*=0.026 in HPIV-2 vs. HPIV-4
† Percentages of Bronchiolitis were significantly different; *P*=0.037 in HPIV-1 vs. HPIV-4 and *P*=0.036 in HPIV-2 vs. HPIV-4

Clinical course

- The median duration of fever in the HPIV-4 infection was significantly shorter than that of HPIV-2 infection (4.0 days vs. 1.0 days, *P*=0.02)
- No differences were found in the proportion of the patients who required hospitalization and ICU care by the HIV types

Table 2. Comparison of Clinical Course of Parainfluenza Virus 1-4 Infections

Characteristic	HPIV-1 (n= 24)	HPIV-2 (n = 19)	HPIV-3 (n = 39)	HPIV-4 (n = 26)	P value
Median duration of fever, Days (range)	2.5 (0-13)	4.0 (0-13)	1.0 (0-9)	1.0 (0-9)	< 0.05*
Hospital admission, n (%)	12 (50.0)	15 (78.9)	25 (64.1)	19 (73.1)	> 0.05
Median length of stay, Days (range)	0.5 (0-15)	3.0 (0-15)	2.0 (0-13)	2.0 (0-19)	> 0.05
Pediatric ICU admission, n (%)	0	0	0	1 (3.8)	> 0.05

NOTE. Data are no. (%) of patients, unless otherwise indicated.
Patients with underlying disease and combined infection were excluded.
* Median duration of fever were significantly different; *P*=0.02 in HPIV-2 vs. HPIV-4

CONCLUSION

We observed seasonal peak in HPIV-4 from late spring to autumn in 2015 and 2017. During these two seasons, HPIV-4 was frequently responsible for hospitalization from lower respiratory tract infections in Korean children.

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