Detection and molecular characterization of Human Parechovirus (HPeV) in respiratory infections in Lombardy (Northern Italy), from August 2022 to February 2023

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Introduction & Purpose

Human Parechovirus (HPeV) is generally associated with mild respiratory and/or gastrointestinal infection. However, it may occasionally cause severe disease such as meningitis, encephalitis and acute flaccid paralysis, particularly in children ≤5 years.

This study aimed at:

1) detecting and investigating the role of HPeV in respiratory infections in Lombardy region from August 2022 to February 2023.
2) molecularly characterizing HPeV circulating strains.

Materials and Methods

Nasal-pharyngeal swabs (NPSs) were collected from influenza-like illness (ILI) cases in the framework of the Italian influenza surveillance network (InfluNet&RespiVirNet) and from acute respiratory infection (ARI) in the framework of RSV surveillance study.

- NPSs were collected from August 1st 2022 (week 18-2022), to February 26th 2023 (week 08-2023).
- All NPSs were tested by real-time RT-PCR targeting the untranslated region of HPeV genome[1].
- A number of HPeV-positive samples was sequenced in VP1/VP3 region (nt 2159-2458)[1].

Results

- 1881 NPSs were collected from:
  - ❑ 1724 (91.6%) ILI cases
  - ❑ 157 (8.4%) ARI cases
- Overall, HPeV was detected in 3.5% (n=65) NPSs:
  - ❑ 75.4% (n=49) in ILI cases
  - ❑ 24.6% (n=16) in ARI cases
- The median age of HPeV-positive cases was 1 year (Inter Quartile Range [IQR]: 2 years); age range: 0-59 years.
- 53.8% (n=35) of HPeV-positive cases were males.

HPeV was identified from week 37-2022 to week 08-2023 with a peak in week 48-2022 (Figure 1). At the peak, 5.5% (9/162) of NPSs tested positive to HPeV.

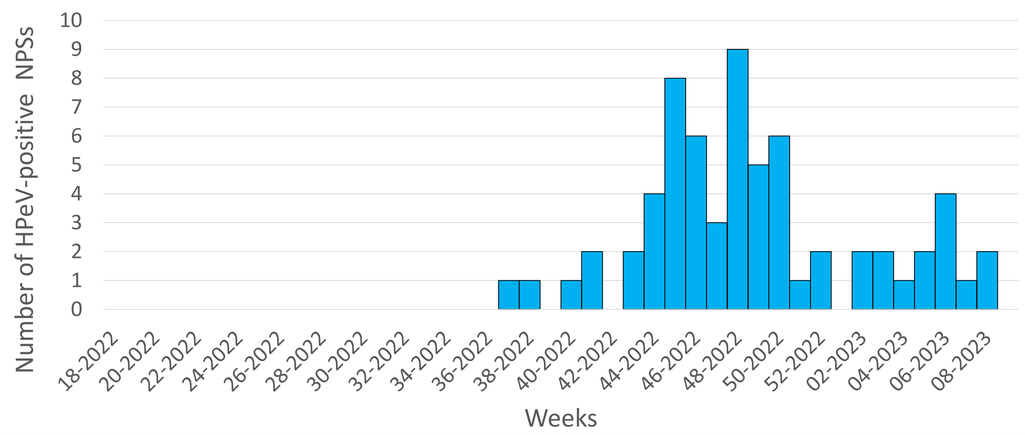

Figure 1: Number of HPeV–positive NPSs by week

In 95.4% of HPeV-positive samples another respiratory virus was detected: respiratory syncytial virus, rhinovirus and influenza virus were those identified more frequently in co-detection (Figure 2).

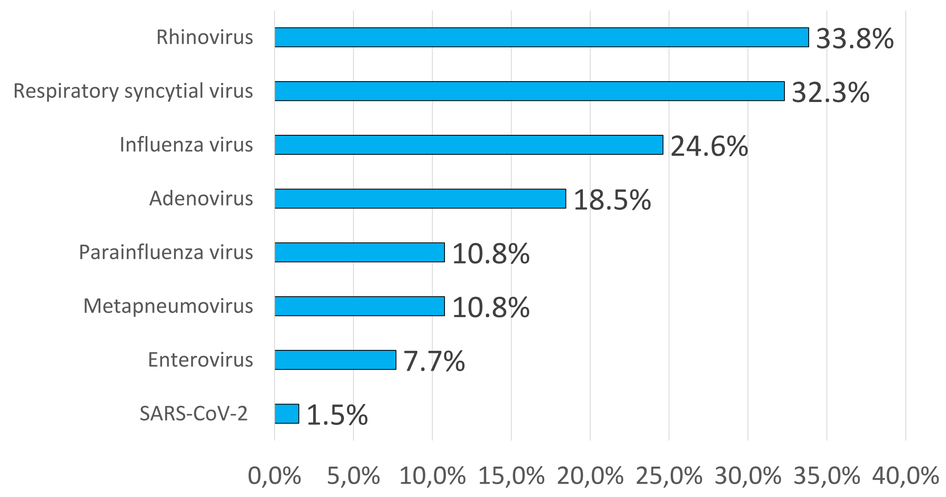

Figure 2: Frequency of respiratory viruses identified in co-detection with HPeV

79.6% (39/49) of HPeV-positive NPSs were collected from children ≤4 years, 14.3% (7/49) from children 5-14 years and 6.1% (3/49) from adults 15-64 years (Figure 3). No HPeV was identified in ILI cases in individuals ≥ 65 years.

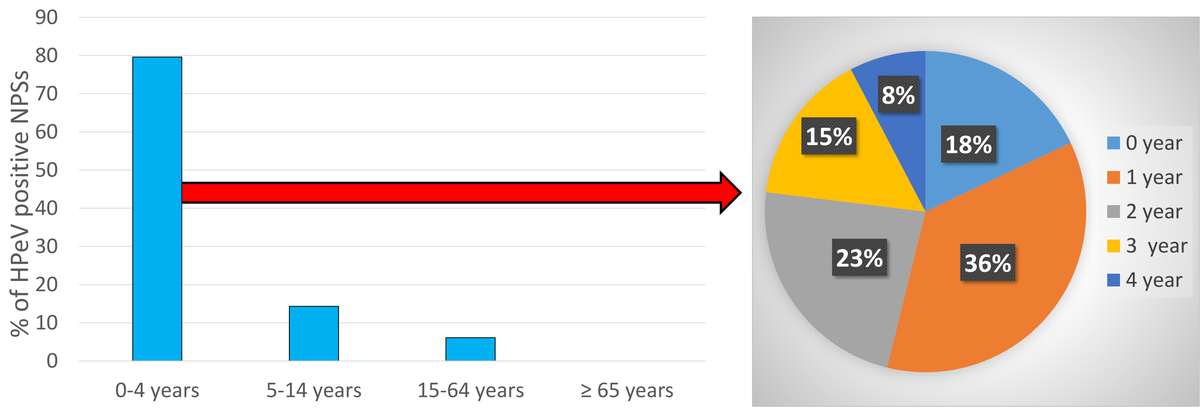

Figure 3: Age distribution of ILI cases tested HPeV-positive

57% (37/65) of HPeV strains was sequenced and their molecular characterization revealed the following genotypes (Figure 4):

- genotype 1: 14% (5/35)
- genotype 3: 17% (6/35)
- genotype 5: 23% (8/35)
- genotype 6: 46%(16/35)

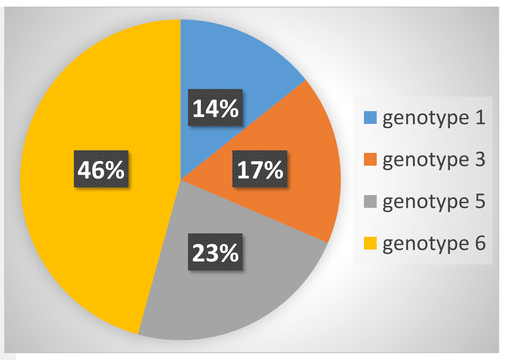

Figure 4: Frequency of HPeV genotypes

Conclusion

- In our ILI/ARI series, HPeV was detected in 3.5% of cases, mainly in children ≤4 years.
- In 95.4% of respiratory samples, HPeV was detected with another respiratory virus, in particular rhinovirus or respiratory syncytial virus.
- Molecular characterization of detected strains showed the co-circulation of several genotypes, with HPeV6 accounting for nearly half of cases.
- Syndromic surveillance of respiratory viruses matched with molecular characterization of HPeV can help to understand HPeV epidemiological features.

Reference
1. J Clin Microbiol. 2008;46:3446–3453