Rhinoviruses in hospitalized children with acute respiratory infection, Croatia 2017-2019

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Background

Although, human rhinoviruses (HRVs) has been traditionally associated with upper respiratory tract infection (URTI), introduction of molecular assays for respiratory viruse detection in clinical laboratories has led to the recognition of HRV as a cause of lower respiratory tract infection (LRTI) as well, especially in vulnerable group of patients such as infants, those with asthma, and immunocompromised patients. Also, there is no data on the prevalence of HRVs in Croatia because there is no routine laboratory diagnosis available in the country. The aim of this study was to determine the prevalence, clinical characteristics and epidemiology of rhinovirus infection in hospitalized Croatian children with acute respiratory infection.

Patients and Methods

A prospective study conducted form March 2017 to February 2019, included 427 children with respiratory symptoms, admitted at Children's hospital Zagreb. Nasopharyngeal swabs were collected in viral transport medium (UTM™, Copan, Italy) and tested for respiratory viruses by multiplex PCR and cDNA synthesis in one–step reaction using Seeplex® RV15 detection kit (Seegene Inc., Seoul, Korea), followed by detection of PCR amplicons using microchip electrophoresis on the MCE®-202 MultiNA device (Shimadzu, Kyoto, Japan). Demographic and clinical illness data were collected by a retrospective review of patient charts.

Results

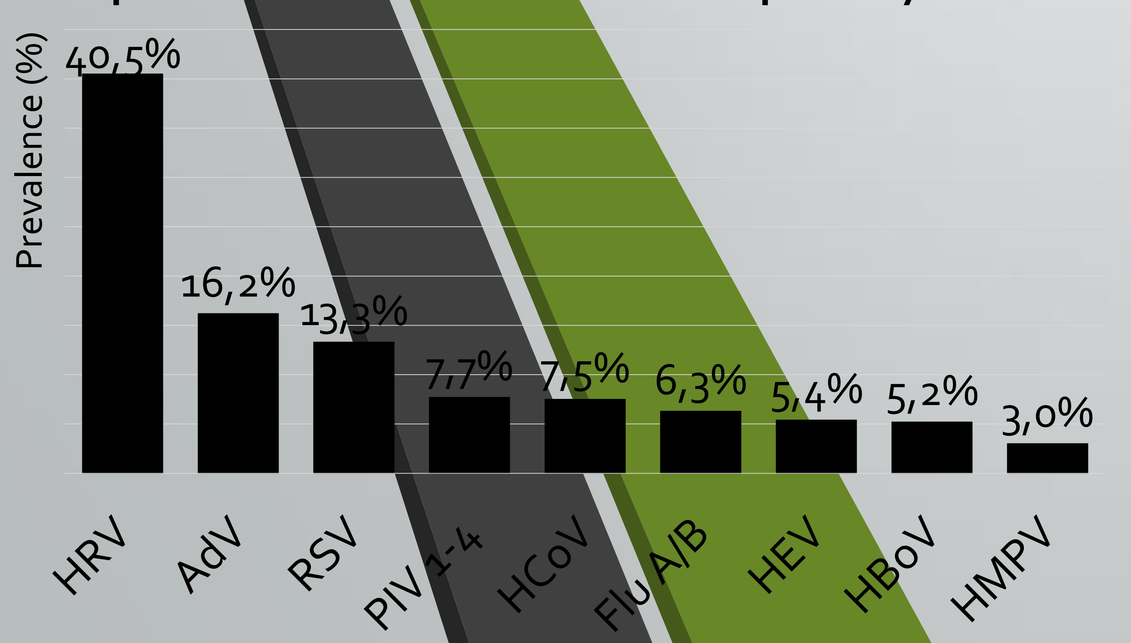
There were 259 boys and 168 girls. According to the age, the following groups were defined: 0-12 months (n=129), 13-36 months (n=117), 37-60 months (n=51), and >60 months (n=130) of age. According to the localization of infection, patients were categorized as those presented with URTI (n=221), and those with LRTI (n=206). The viral etiology was proved in 320/427; 74.9% of the patients. A single virus was diagnosed in 67.8% of the cases patients, while coinfection with two or more viruses in 15,3% and 4.4% of the positive patients, respectively. The most commonly detected respiratory virus was HRV (Figure 1), diagnosed in 40.5% of all patients; 63.6% as monoinfection, and 36.4% as codetection with other respiratory viruses. Fifty-one percent of children with rhinovirus monoinfection presented with LRTI. There were no statistically difference in rhinovirus prevalence according to the gender, age, and localization of infection ($P > 0.05$) (Table 1). HRVs were continuously detected throughout whole year with peak incidence in spring and autumn months. positive

Table 1. **Rhinovirus prevalence according to the age, gender and localization of infection**

		Rhinovirus positive* / Total N (%)	P value	Rhinovirus monoinfection / Total N (%)	P value
Age (months)	0-12	53/129 (41)		31/129 (24)	
	13-36	51/117 (44)		27/117 (23)	
	37-60	20/51 (39)		11/51 (19)	
	> 60	49/130 (38)	0.8153	41/130 (32)	0.3366
Gender	Male	106/259 (41)		64/259 (25)	
	Female	67/168 (40)	0.8297	46/168 (27)	0.5376
Localization of infection	URTI	78/221 (35)		54/221 (24)	
	LRTI	95/206 (46)	0.0228	56/206 (27)	0.5161

* monoinfection and codetection with other viruses;
URTI= upper respiratory tract infection; LRTI = lower respiratory tract infection

Figure 1. **Frequency of detected respiratory viruses in hospitalized children with acute respiratory infection**



HRV = human rhinovirus; AdV = adenovirus; RSV = respiratory syncytial virus; PIV 1-4 = parainfluenza viruses types 1 to 4; HCoV human coronaviruses 229E/Nl63 and OC43; Flu A/B = influenza virus type A and B; HEV = human enterovirus; HBoV = human bocavirus; HMPV = human metapneumovirus

Conclusions

HRVs were the most prevalent respiratory viruses in this study causing significant proportion of LRTIs. These results highlight its role in etiopathogenesis of LRTI not only in infants, but also in children of all ages, and point to the importance of implementing laboratory diagnostics for HRVs in clinical laboratories.

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