Viral Respiratory Infections with Bocavirus in Romania

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Abstract

Human Bocavirus was described in 2001 by Tobias Allander et al. (Karolinska University Hospital, Stockholm, Sweden) in nasopharyngeal aspirates collected from children with acute respiratory infections. The technique used was a random PCR cloning sequencing, observing that there is a new DNA virus identified in 17 of 540 samples (3, 1%).

Full spectrum of diseases associated with human Bocavirus (BoV), remains to be defined. Presence of the virus in respiratory secretions, serum, and stool suggests that may cause systemic diseases.

Bocavirus belongs to Parvoviridae family and is a single-stranded DNA virus.

Analyzed samples in our study were nasopharyngeal exudates collected from 309 patients aged 19 days-96 years, hospitalized with a diagnosis of SARI (Severe Acute Respiratory Infections) in hospitals from eight counties and Bucharest in September 2011–September 2012.

Diagnostic method used to detect human BoV was Multiplex RT-PCR (Reverse Transcription–Polymerase Chain Reaction) with Seeplex 15 One Step RV ACE Detection Kit.

Of the 309 samples tested, 10 were positive for human Bocavirus. All 10 samples were collected from children (7 months-3.5 years) with bronchiolitis and pneumonia without gastrointestinal manifestations.

The conclusions observed from the data analysis were:

- HumanBoV is also present in Romania, meeting at young ages children.
- The percent of 3, 3% is similar to that found in Sweden, but lower than in Jordan (9%), China (7%) and Taiwan (5, 6%).
- Symptoms of patients hospitalized and diagnosed with BoV were only respiratory (LRTI-lower respiratory tract infections) and no digestive.
- BoV positive cases were not associated with others viruses.

Keywords: Human Bocavirus; RT-PCR; Bronchiolitis; SARI

Introduction

Allander et al. at the Karolinska Institutet in Stockholm, Sweden, first cloned this new member of the family of Parvoviridae in 2005 from pooled nasopharyngeal aspirates (NPA, collection of aspirated fluid from the back of the nasal cavity) [1]. They used a novel technique called molecular virus screening, based on random cloning and bioinformatical analysis. This technique has led to the discovery of new viruses such as polyomavirus KI (Karolinska Institute) [2] and WU (Washington University) [3], which are closely related to each other and have been isolated from respiratory secretions.

The name Bocavirus is derived from Bovine and Canine, referring to the known hosts for other members of this genus; the bovine parvovirus which infects cattle and the minute virus of canines which infects dogs [4].

Parvoviruses (Latin: small viruses) have a 5 kilobase long single stranded DNA.

Full spectrum of diseases associated with human BoV remains to be defined. Presence of the virus in respiratory secretions, serum, and stool suggests that may cause systemic diseases.

The aim of the study was to find that BoV is also present in Romania.

Materials and Methods

The study was part of the SARI (Severe Acute Respiratory Infections) surveillance system which has been set up in Romania since 2009. During the season 2011-2012, the surveillance system comprised 26 hospitals (in Bucharest and 8 counties). The case definition of SARI [5] for the patient’s ≥ 5 years old (with onset during the previous 7 days before hospitalization) consists of: fever >38°C, AND cough or sore throat, AND shortness of breath or difficulty breathing.

Case definition of SARI in children <5 years old is the definition for pneumonia and severe pneumonia [5] (Table 1). The SARI system was developed under the coordination of National Centre for Surveillance and Control of Communicable disease and National...
work protocol was according to manufacturer’s instructions: Seegene’s with Seeplex 15 One Step RV ACE Detection kit (South Korea). The samples were transported to the laboratory in viral transport medium, on the same day and processed either on the first day or on days 2-96 years which were admitted to hospitals from Bucharest and 8 other counties from Romania. The samples were transported to the laboratory of the National Influenza Centre in “Cantacuzino” NIRDMI. There is a network of sentinel general practitioners (GPs) from each county (total number of GPs=313) who weekly report to NPHI the number of patients who consult them with an influenza-like illness (ILI) and a network of severe acute respiratory infections (SARI) (total number of units care=26). The specimens collected are examined at the NIC for identity samples: samples from SARI, ILI or SARI (Table 2 and Table 3).

We conducted the study between September 2011 and September 2012 to find that BoV is also present in Romania or not. In the 2011/12 season, from week 40 of 2011 through week 20 of 2012, influenza viruses have been detected only sporadically throughout the study area. Sentinel or non sentinel ILI samples are tested first by Real Time-PCR for Influenza A&B. Positive samples for type are subtyped by RT-PCR for H1 and H3. H3 positives are submitted to Real Time-PCR for H1 and H3. H3 positives are submitted to Real Time-PCR for H1 and H3. H3 positives are submitted to Real Time-PCR for Influenza A and B. Positive samples for type are subtyped by RT-PCR for H1 and H3. H3 positives are submitted to Real Time-PCR for Influenza A&B, Negative samples for Influenza A&B are tested by Reverse Transcription-PCR for Para Influenza, RSV A&B, hMPV, HEV, Rhinovirus, Corona virus or PCR for Adenovirus and Bocavirus. In the 2011/12 season, from week 40 of 2011 through week 20 of 2012, influenza viruses have been detected only sporadically throughout the country. 289 influenza viruses have been detected in 1050 clinical samples originating from patients with ILI or SARI (Table 2 and Table 3).

Distribution by age groups of SARI samples is shown in table 4.

Table 2: Typing and subtyping results of positive detected samples in ILI cases in 2011-2012 influenza seasons.

| Disease       | Total samples ILI | Influenza virus A/H3 | % H3 | Influenza virus B | % B | Influenza virus A/H1 | Total pos | % pos |
|---------------|------------------|----------------------|------|------------------|-----|---------------------|-----------|-------|
| Influenza virus A/H3 | 216         | 97.74                | 5    | 2.26             | 0   | 221                 | 29.27     |

Table 3: Positive detected samples in SARI cases in 2011-2012 seasons by etiological agents.

| Age                          | Diseases                                                                 | Bronchiolitis of infancy |
|------------------------------|--------------------------------------------------------------------------|--------------------------|
| Children below 2 months      | - symptoms: cough or difficult breathing and - and no general danger signs (the sign ‘stopped feeding well’ in young infants replaces ‘unable to drink’ of the older children as a danger sign), wheezing, stridor in calm child or fever or low body temperature | - Clinically diagnosed respiratory condition presenting with breathing difficulties, cough, poor feeding, and intubility and, in the very young, apnea. These clinical features, together with wheeze and/or crepitations on auscultation combine to make the diagnosis. Bronchiolitis most commonly presents in infants aged three to six months |
| Children 2 months up to 5 years old | - symptoms: cough or difficult breathing and - and signs: 50 or more breaths per minute for infants age 2 months up to 1 year, or 40 or more breaths per minute for children age 1 up to 5 years old - and no chest indrawing, general danger signs, stridor in calm child or severe malnutrition | - symptoms: cough or difficult breathing and signs: chest indrawing and no general danger signs, stridor in a calm child or severe malnutrition |

Results and Discussion

In Romania, the influenza surveillance is performed by the Romanian National Public Health Institute (NPHI) in Bucharest and the National Influenza Centre (NIC) in “Cantacuzino” NIRD MI. There is a network of sentinel general practitioners (GPs) from each county (total number of GPs=313) who weekly report to NPHI the number of patients who consult them with an influenza-like illness (ILI) and a network of severe acute respiratory infections (SARI) (total number of units care=26). The specimens collected are examined at the NIC for the presence of influenza virus and other respiratory viruses.

Sentinel or non sentinel ILI samples are tested by Real Time-PCR for Influenza A and B. Positive samples for type are subtyped by RT-PCR for H1 and H3. H3 positives are submitted to Real Time-PCR for Influenza A in order to differentiated between human and swine H3.

Sentinel or non sentinel SARI samples are tested first by Real Time-PCR for Influenza A&B. Negative samples for Influenza A&B are tested by Reverse Transcription-PCR for Para Influenza, RSV A&B, hMPV, HEV, Rhinovirus, Corona virus or PCR for Adenovirus and Bocavirus.

In the 2011/12 season, from week 40 of 2011 through week 20 of 2012, influenza viruses have been detected only sporadically throughout the country. 289 influenza viruses have been detected in 1050 clinical samples originating from patients with ILI or SARI (Table 2 and Table 3).
The symptoms of patients hospitalized and diagnosed with BocaVirus were only respiratory and no digestive.

Human BocaVirus positive cases were not associated with other viruses.

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