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Seasonal variations of respiratory viruses detected from children with respiratory tract infections in Riyadh, Saudi Arabia

Saad Sawal Albogami^{a,*}, Meshal R. Alotaibi^a, Saud A. Alsahli^a, Emad Masuadi^a,
Mohammad Alshaalan^b

^a KSAUHS, Saudi Arabia

^b KASCH, Saudi Arabia

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ABSTRACT

ARTIs have a huge impact in health systems in which 20–30% of all hospital admissions and 30–60% of practitioner visits are related to respiratory tract infections. The aim of this study is to determine the prevalence, age distribution, and seasonal variation of respiratory viruses. This study was descriptive retrospective study in which all patients 14 years of age and below who presented with signs and symptoms of ARTIs between January 2013 and December 2014 and had respiratory specimen tested by direct immunofluorescence assays for viruses identification were included in the study. During that period, a total of 4611 patients who presented with ARTIs from January 2013 to December 2014 were investigated, viruses were detected in 1115 (24%). RSV was associated with 97.4% of the total viral pathogens. Viruses were detected throughout all the two years with a peak in winter; Dec (n : 265), Jan (n : 418), Feb (n : 218), and Mar (n : 109). Viral pathogens are very important cause of ARTIs in our region. RSV was the most common virus detected with the highest detection rate in children who are two years old and below. A multi-center surveillance with more sensitive detection methods like PCR may help to provide a comprehensive understanding of virus distribution in our area, which may contribute implant an effective prevention approach for each virus.

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Introduction

Acute respiratory tract infections (ARTIs) are the most common causes of both morbidity and mortality in children worldwide especially in developing countries [1].

ARTIs have a huge impact in health systems of developing countries responsible for 19% of deaths in children younger than five years of age and 8.2% of all disabilities [1].

20–30% of all hospital admissions and 30–60% of practitioner visits are related to respiratory tract infections [2–4]. ARTIs are commonly classified as upper respiratory tract infections (URTIs) and lower respiratory tract infections (LRTIs) according to the site of infection. Annual mortality of LRTIs in children younger than five years of age estimated to be 1.8 million worldwide [5]. In United States (US), pneumonia remains the leading cause of hospitalizations accounting for 70% of admissions in children younger than five years [6]. Bacteria and fungi can cause respiratory infections, however, viruses are responsible for majority of cases ranging from 40%

to 50% of infections in infants and children hospitalized with pneumonia in developing countries [7]. Respiratory syncytial virus (RSV) is the most commonly detected virus among children with LRTIs [8,9]. RSV is associated with more than 100 000 pediatric hospitalizations annually in the US [10]. Other important common viruses include influenza A and B, parainfluenza viruses, adenoviruses and metapneumovirus [9].

The distribution of respiratory viruses causing ARTIs varies based on the populations, geographic areas and the socioeconomic status [9]. Identifying the prevalence of the common viruses causing ARTIs and the seasonality for these viruses in our region is essential to avoid antibiotics overuse. In Saudi Arabia, a study showed a significant misuse of antibiotics in which 74.7% of patients presented with viral ARTIs were treated with antibiotics. Therefore, further studies in developing countries including Saudi Arabia are needed to help in prevention, control, and treatment of ARTIs.

The main aim of this study is to determine the prevalence of respiratory viruses, age distribution, and seasonal variations of these viruses in patients who are 14 years of age and below both in emergency room as well as inpatient settings.

* Corresponding author.

E-mail address: Saad.99.2009@hotmail.com (S.S. Albogami).

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Materials and methods

Setting and subjects

This retrospective data base review study was conducted in King Abdul-Aziz Medical City (KAMC), a tertiary hospital in Riyadh, Kingdom of Saudi Arabia. The data was collected from the microbiology data base record. We included patients who were 14 years of age and below and presented with signs and symptoms of ARTIs from January 2013 to December 2014 and had respiratory specimen tested by direct immunofluorescence assays (DFA) for viruses identification. Patients presented with ARTI more than once in a different visit of at least one month interval were re-included in the study and analyzed as different patients. DFA was performed per the manufacturer's instructions (IMAGEN, Oxoid, Cambridgeshire, United Kingdom) to identify the following viruses: respiratory syncytial virus (RSV), adenovirus (ADV), Influenza-A virus, Influenza-B virus, Parainfluenza 1–3 viruses.

Data collection

Microbiology data base record was reviewed and data were collected in the data sheet. The microbiology data collected in the data sheet included patients' demographics (medical record number,

age, and gender), respiratory sample results to demonstrate the type of virus and the date for positive samples. The setting where the patients being treated whether in emergency room or inpatient ward was also recorded.

Statistical analysis

We developed data collection sheet, and data from these forms were entered into Microsoft Excel. Data were analyzed using Statistical Package for Social Science (SPSS) version 23 (SPSS Inc., Chicago, IL, USA). Descriptive data were presented as frequencies and percentages. Continuous data were analyzed using the *t*-test, and categorical data were analyzed using the Chi-square test. A *p*-value <0.05 was considered statistically significant.

Result

A total of 4611 patients who presented with ARTIs from January 2013 to December 2014 were investigated. 1115 of them had a detected virus. The median age of our population was 16 months. The overall detection rate was 24% (2013 and 2014 were 20% and 27% respectively). Of the positive samples, RSV was associated with 1086 cases that accounted for 23.5% of ARTI and 97.4% of the total viral pathogens. Other viruses detected were ADV (0.3%), Influenza-

Table 1
Distribution of virus infections by gender, age, and setting.

		Disease		Setting	
		Negative	Positive	Main hospital	ER
Age groups ≤3 months	Female	299	139	348	88
	Male	444	178	478	143
3.01–6 months	Female	265	98	244	118
	Male	366	140	328	177
6.01–12 months	Female	336	136	333	139
	Male	430	142	412	160
12.01–24 months	Female	290	78	321	47
	Male	323	90	359	54
24.01–60 months	Female	227	42	251	18
	Male	259	48	295	12
>60 months	Female	125	12	133	4
	Male	132	12	138	6

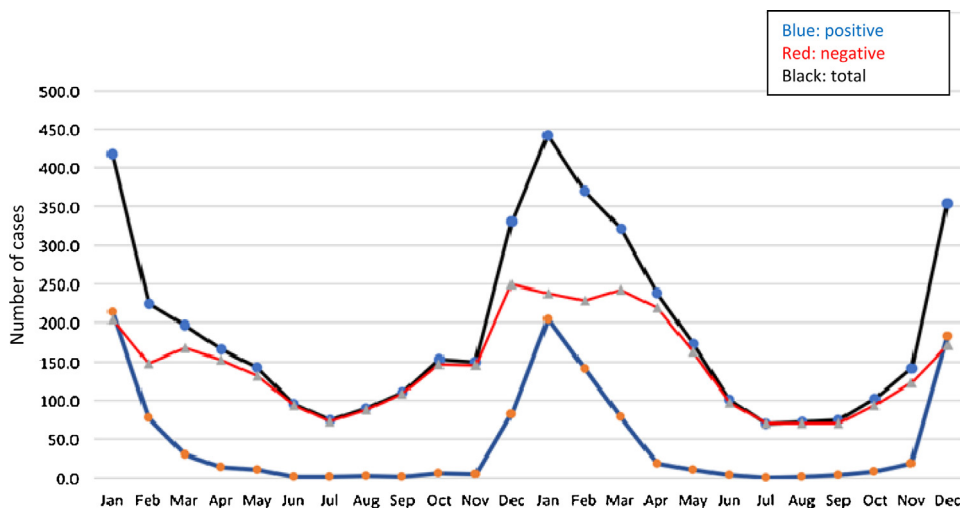


Fig. 1. The monthly distribution and frequency of overall virus detection during 2013–2014.

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