

Full Length Research Paper

The respiratory syncytial virus may not always be responsible for Bronchiolitis in children

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The aim of this study is to investigate the viral agents and the viral profile in children under 5 years of age who are referred to our hospital due to acute wheezing. The nasal smears of 55 children who were referred to Kagithane State Hospital from now on (KSH) with acute wheezing between November 2009 and March 2010 were analyzed with multiplex PCR and the distribution of respiratory virus detected in these smears was evaluated retrospectively. Out of fifty five children whose nasal smear results were evaluated, 22 (40%) were male and 33 (60%) were female. The age range was 3 months to 5 years. The nasal smears revealed that one patient (2%) had adenovirus, 11 patients (20%) had Rhinovirus A-B, one patient (2%) had Rhinovirus C which is not previously encountered in our country, 5 patients (9%) had RSV-A, 16 patients (29%) had RSV-B and one patient was diagnosed with co-infection of RSV-A and Rhinovirus A-B. This retrospective study is conducted to find out the epidemiologic strategy of viral agents in acute lower respiratory illnesses to modify the treatment protocols and to reduce the mortality which we hope will contribute to the literature.

Key words: Wheezing, lower tract respiratory illness, respiratory syncytial virus, adenovirus, rhinovirus.

INTRODUCTION

Acute lower respiratory tract infections especially in cold season is important in the rate of hospital admission and the mortality (Maria et al., 2004). In the world, 20% of all acute lower respiratory tract infections account for mortality of children under the age 5 (World Health Organisation, 2010). Children in developed nations represent 70% of 1.9 million children under 5 years of age who died of respiratory tract infections (Najwa et al., 2010).

Respiratory tract infections in childhood are the main reason for acute wheezing (Selinay et al., 2009). Wheezing attack up to age 3 in one out of 3 children and the prevalence of 50% of cumulative wheezing less than 6 years of age were detected (Brand et al., 2008).

The qualitative and quantitative damage to public caused by viral infections transmitted via respiratory route has always been difficult to measure. One of the reasons

is difficulty in detecting the virus clinically and the other is the inadequately reliable serological tests for detection of these viruses (Kelly et al., 2004). Nowadays, a high technique with higher sensitivity like PCR is used to detect the viral pathogens. Thus, this enables the better evaluation of prevalence of viral infection found in patients treated for acute wheezing (Kalu et al., 2010).

This study aims to analyze retrospectively the viruses causing acute wheezing in patients under 3 years of age coming from low socio-economic background in heavily populated city like Istanbul, who were referred to our clinic during winter season with acute wheezing. Thus, in turn it contributes to implementation of treatment protocols used in lower respiratory tract infections.

MATERIALS AND METHODS

In our study, the respiratory virus distribution detected in nasal smears of fifty five children aged between 3 months-5 years who were referred to KSH with acute wheezing between November 2009 and March 2010 was evaluated retrospectively.

The factors such as age, sex, complaints at admission and their

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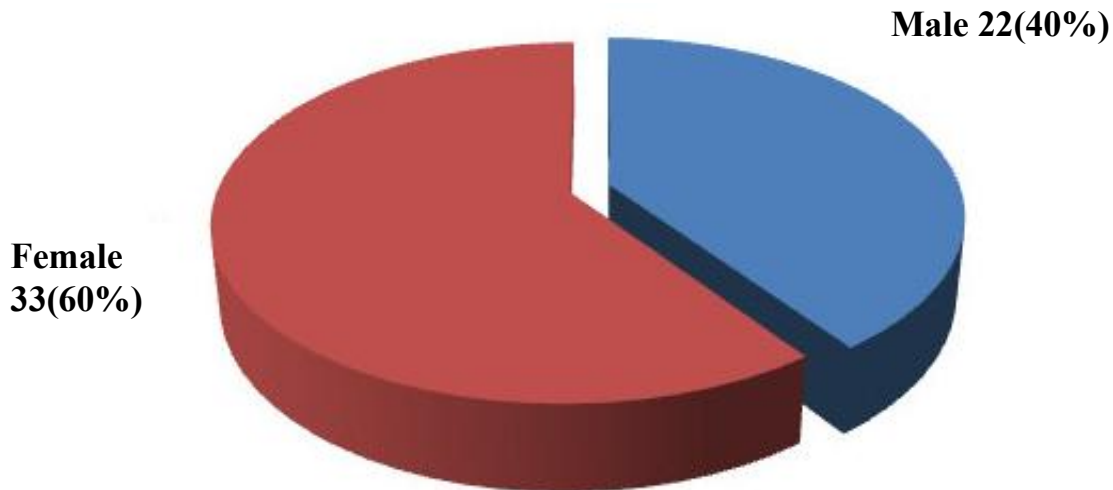


Figure 1. The distribution of the patients based on gender.

duration, recurrent wheezing attacks, atopy in the family, smoking at home, and the number of people sharing the same room were analyzed. In addition, physical examination, leucocytosis (WBC normal max limit: 11,000), serum C-reactive protein (CRP) levels (normal max limit: 1mg/dl), lung x-ray and treatments used are evaluated.

RNA was extracted from nasal smears of patients using Viral Gene –Spin Virus RNA/DNA isolation kit which came from Copan Universal Transport Medium (UMT) . Extracted RNAs were converted to cDNA using Fermentas’s RevertAid™ First Strand cDNA Synthesis Kit.

Multiplex PCR was done using RV12 ACE Detection Kit in order to isolate 12 respiratory viruses (Influenza virus A-B, Parainfluenza virus 1-2-3, RSVA-B, Metapneumovirus, Coronavirus OC43/HKU1-229E/NL63, Human Rhinovirus A-B and Adenovirus) from formerly obtained cDNA. PCR Products after amplification was conducted by Lab901’s Screen Tape® automatized gel electrophoresis. Results obtained were analyzed by SPSS11.5 program.

RESULTS

The results of nasal smears from 55 patients referred to our clinics with acute wheezing between November 2009 and March 2010 were evaluated along with socio economic features, family history, physical examination, laboratory findings and treatment modalities.

In the study 22 (40%) were male, and 33 (60%) were female. The ages ranged from 3 months to 5 years and the mean age was $17-47 \pm 14.3$ (Figure 1).

Although all patients had complaints of wheezing and rhino rhea at admission 31 patients (56.3%) had remarkable coughing and 42 patients (76%) had fever. The duration of complaint was 1-5 days and the mean was 3.1 ± 32 patients (58.1%) had recurrent wheezing and out of these patients 12 of them had atopic disease in the first degree relatives. The number of patients having smoking at home was 37(67%).

The physical examination revealed that 51 patients (93%) had extended expirium and sibilant rhonchus, 6

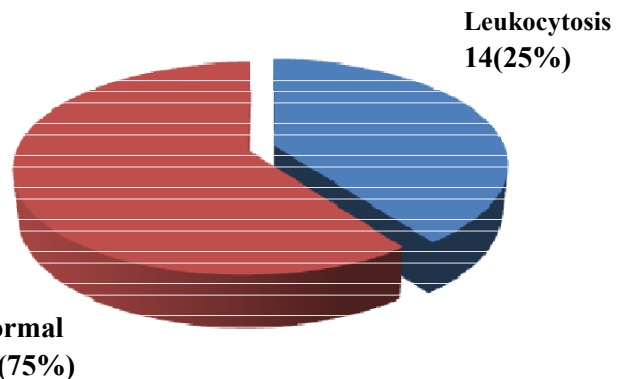


Figure 2. The distribution of the leukocytosis of the patients.

had (10%) crepitant rales. Laboratory reports indicated that 14 patients (25.4%) had leucocytosis (Figure 2). Twenty one patients (38%) had positive CRP and 34 patients (62%) had normal CRP (Figure 3). Forty nine patients (89%) had normal lung x-ray findings whereas 6 patients (11%) had infiltration (Figure 4).

Nasal smears of fifty five patients showed that 1 patient (1%) had Adenovirus, 11 patients (20%) Rhinovirus A-B, 1 patient (1%) Rhinovirus C, 5 patients (9%) RSV-A, and 16 patients (29%) RSV-B. No virus was detected in 20 patients (36%) (Figure 5). Acute otitis was seen in 6 patients (37%) of 16 patients with Rhinovirus A-B positive, and in 4 patients (36%) of 11 patients with Rhinovirus A-B.

Bronchodilator agent (nebulized salbutamol) was used in 40 patients (72.7%). Antibiotic therapy was give to 35 patients (63.6%) and systemic steroid was administered to 15 patients (27%). One patient (2%) out of 55 with Rhinovirus-C was hospitalized whereas other 54 patients were treated as outpatients. Our case is unique as Rhinovirus C is not previously encountered in our country.

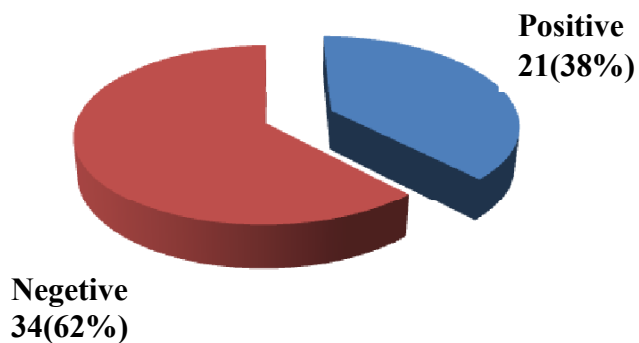


Figure 3. The result of CRP values.

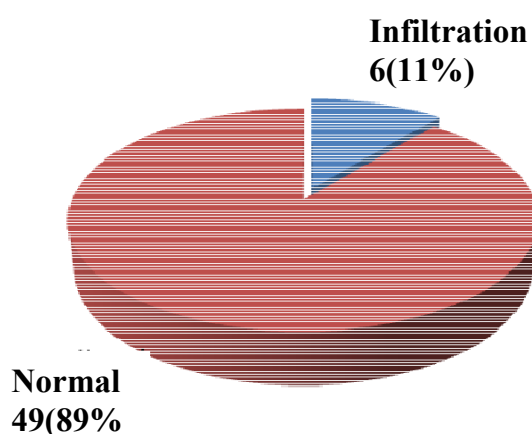


Figure 4. The results of lung X Ray of the patients.

DISCUSSION

Severe pneumonia, bronchitis and bronchiolitis and subsequent extended hospital stay, respiratory support at intensive care unit, nazocomial infections and death can be seen with lower respiratory tract infections. Acute viral infections generally the leading cause of high mortality with children and the elderly (Kelly et al., 2004; Wolf et al., 2006). Acute lower respiratory tract infections especially in cold seasons are important in causing hospital admissions and death of children (Heymann et al., 2004). RSV causing acute wheezing in children and influenza viruses especially in infancy is frequently seen. On the other hand, it is observed that Rhinoviruses trigger asthma exacerbations causing wheezing in older children (Jartti et al., 2004; Heymann et al., 2004). In studies, a strong relationship is seen between the asthma exacerbations, chronic respiratory tract symptoms and viral infections.

Making treatment protocols for acute lower respiratory tract infections and implementing epidemiological strategies for respiratory tract viruses become important when considering new developments in synthesis of antiviral agents, new virus detections and relationship

between viral infections and asthma (Soto-Martinez et al., 2010; Alberto et al., 2008; Fernando, 2009; Chang et al., 2004).

In infants and children virus rates causing wheezing were found to be consecutively 86% in Alberto et al. (2008) studies, 69% in study conducted by Kusel et al. (2006), 75% in study by Maffer et al. (2008). In our study, the rate of virus causing wheezing was 64% which shows the compliance with the other studies.

RSV is a viral agent frequently seen in children with acute bronchiolitis. In our study this rate added up to 38% being 9% in RSV-A and 29% in RSV-B. Our rate seems to be in compliance with the approximate rate of 35-45% found with other studies (Alberto et al., 2008; Maffey et al., 2008; Rey et al., 2006). When analyzing RSV and Metapneumovirus seasonal distribution, RSV was seen between March-July whereas Metapneumovirus were detected in August-November. The symptoms in children infected with Metapneumovirus and RSV show similarity (Teeratakulpisarn et al., 2007). We believe that the absence of Metapneumovirus in our study is because Metapneumovirus seasonal distribution did not correspond to our time of analysis.

Rhinoviruses (RV) are pathogens frequently seen especially in upper respiratory infections (Susanna et al., 2007; Boon-Huan et al., 2009). These viruses also lead to pneumonia and asthma exacerbations (Susanna et al., 2007). RVC, which is a recent virus responsible for more severe disease is added to the formerly detected group of RV-A and RV-B (Zichun et al., 2008). In studies rhinoviruses are encountered in 23 to 25% in children with wheezing (Alberto et al., 2008; Maffey et al., 2008; Rey et al., 2006). In our study Rhino A-B being 20% Rhinovirus C totaling up to 22% is found to be in compliance with rates in literature. Rhinovirus C, as shown in our study, is an important pathogen in children with fever, severe wheezing attack and in children with pneumonia and bronchiolitis requiring hospital admission (Cristina et al., 2009).

In studies, it has been shown that wheezing in children infected with Rhinovirus decreased during 2 months with standard dose of prednisolone. Thus, this shows the importance of respiratory virus detection in treatment and follow-up plans (Jartti et al., 2006). Adenovirus was found to be 2- 3 % in acute lower respiratory tract infections (Jartti et al., 2004; Maffey et al., 2008). In our study, 2 % rate was found to be in accordance with other studies.

Viral lower respiratory tract infections generally are associated with upper respiratory tract infections of bacterial origin. However, bacterial lower respiratory tract infections were seldom seen to accompany as systemic inflammatory response (Lehtinen et al., 2006). In our study 35 % acute otitis media and 11% lung infiltration were observed which, in turn was in accordance with the literature (Lehtinen et al., 2006).

Although acute lower respiratory tract infections in the world are main causes of morbidity and mortality in early childhood, little progress was seen with respect to virus

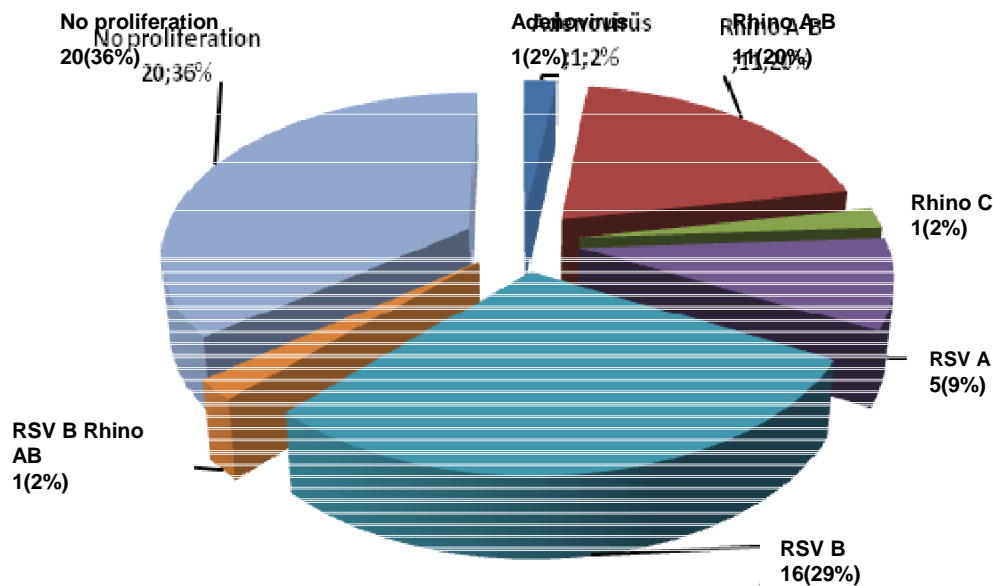


Figure 5. The distribution of the respiratory viruses of the patients.

control and prophylaxis (Kusel et al., 2006).

In our study, our aim is to detect respiratory tract viruses especially newly detected Rhinovirus-C, which is not previously encountered in our country, and to contribute to the adoption of epidemiological strategies for respiratory tract viruses.

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