

RELATIVE FREQUENCY OF PARAINFLUENZA INFECTION IN PATIENTS WITH RESPIRATORY INFECTIONS

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Abstract- According to statistical data from WHO, respiratory tract infections are among the most important health problems all over the world. Differentiating viral from other causes of respiratory infections is difficult, but a good knowledge of viral etiologic factors can guide the physicians in the diagnosis and treatment of the disease. We carried out this descriptive, case-series study to evaluate the relative frequency of parainfluenza virus (PIV) infections in upper and lower respiratory tract infections. A total of 263 three children with respiratory infection were studied from autumn 1998 to autumn 2000. We prepared samples from their nasopharynx with sterile swabs for viral culture and study of cytopathic effects of PIV. Thirty six cases had positive culture for PIV (14%). There was a significant statistical correlation between the prevalence of PIV infection and age of patients. The highest prevalence was in the of 1-5 years old age group. There was also a correlation with season, and majority of cases were seen in autumn and spring ($P < 0.0001$). There was no significant correlation between PIV infection and sex. PIV infection had significant correlation with croup and bronchiolitis ($P < 0.0001$). PIV plays an important role in causing lower respiratory tract infections.

Acta Medica Iranica, 42(4): 281-284; 2004

Key words: Respiratory infections, parainfluenza virus

INTRODUCTION

Respiratory tract infections are among the most important health problems in many countries. Acute infections of respiratory system are responsible for about 4 million deaths in children under 5 years and comprise 20-40 percent of hospital admissions (1).

Parainfluenza virus (PIV) type I is responsible for 46% of upper respiratory infections and 5% of lower respiratory infections; PIV type II is responsible for 40% of upper and 2% of lower respiratory infections and the PIV type III is responsible for 64% of upper and 9% of lower

respiratory infections (2).

Differentiating viral from other causes is difficult and sometimes even impossible on the clinical grounds, but a good knowledge of viral etiologic factors and clinical signs can help and guide the physicians to some extent in the diagnosis and treatment of the disease. Aims of this study were evaluation of the relative frequency of PIV infections in upper and lower respiratory infections, ascertaining the relation of PIV infection with the season, age and sex and ascertaining the relation of special clinical signs with PIV.

MATERIALS AND METHODS

This research is a case-study and 263 samples were gathered over a two year period, from autumn 1998 to autumn 2000.

Received: 22 May 2002, Revised: 2 Feb. 2003, Accepted: 12 Nov. 2003

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PIV in patients with respiratory infections

First the selection was made according to clinical signs, then with the help of sterile swabs (dry/ wet), a layer of epithelial cells was obtained from nasopharyngeal region. Before sampling, informed consent was obtained from all patients.

The samples were then placed in a transport device (environment) so that before transferring they remained in a refrigerator. The samples were sent to the virology department of Pasteur institute, Tehran, where they remained in a freezer at -70°C up to the time of examination.

For the purpose of study the samples were kept initially in the containers at lab temperature till they lost their frozen state. Then with the help of sterile Pasteur pipette, 0.3 ml of each sample was inoculated in two tubes containing culture material and sensitive cell (substrate) (HEP-2).

These tubes with the samples were kept in warm chamber (hot case) at 37°C for a period of 45 to 60 minutes, then the tubes were removed and to each tube 2 ml of culture material (MEM) was added. They were again placed in the warm chamber (hot case) at 37°C and observed for six days. In case some cytopathic effects were noticed, again the passage was prepared from the samples and studied for microscopic changes. Due to unavailability of specific antiserums, it was not possible to ascertain the type of PIV.

RESULTS

From 263 samples from nasopharynx, 36 cases

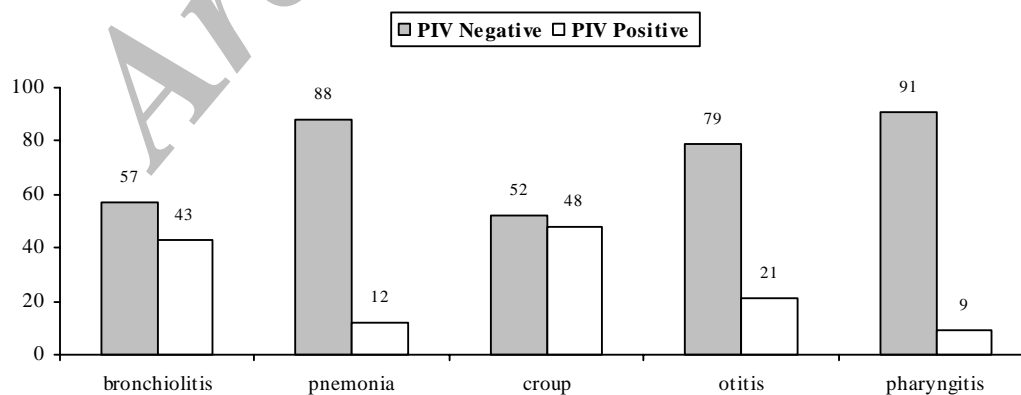


Fig. 1. Relative frequency of parainfluenza virus (PIV) infection with respect to clinical diagnosis.

(14%) were found positive for PIV. About 43% of bronchiolitis, 12% of pneumonia, 48% of croup, 21% of otitis, 9% of pharyngitis and 12% of rhinitis cases were due to PIV (Fig.1). PIV infection had a significant relationship with bronchiolitis ($P<0.0001$) and croup ($P<0.0001$).

On the bases of age, cases were divided into three groups. Cultures were positive for PIV in 17% of 0-1 age group, 18% of 1-5 age group and 2% of > 5 age group. Twenty four percent of positive PIV cultures were in the 0-1 age group, 55% in 1-5 and 3% in the > 5 age group. The PIV infection in the 0 to 14 years age group showed a statistical relation with the age ($P= 0.0057$), and majority of the cases were seen within age group of 1 to 5 years (Table 1).

In this study 111 samples were collected in winter, 67 in autumn, 40 in summer and 45 in spring. About 25% of PIV infections were reported in winter, 58% in autumn, 17% in spring and no case were reported during summer. The frequency of PIV infection was found to be related directly to the season ($P<0.0001$) in a manner that majority of cases were seen in autumn and spring (Table 2).

PIV infection showed no significant relation with sex.

As regards the clinical signs, PIV infection (with a failure rate of 10%) was found to be related with sore throat ($P= 0.057$). Other clinical signs such as nasal discharge, fever, cough and respiratory distress showed no relation with the PIV infection (Fig.2).

Table 1. Relation of PIV infection in children with season*

Season	PIV Positive	PIV Negative	Total
Winter	9(8)	102(92)	111(42)
Autumn	21(31)	46(69)	67(26)
Summer	0(0)	40(100)	40(15)
Spring	6(13)	39(87)	45(17)
Total	36(14)	227(86)	263(100)

Abbreviation: PIV, parainfluenza virus.

*Data are given as number (percent).

Table 2. Relation of PIV infection in children with age *

Age	PIV Positive	PIV Negative	Total
0-1 year	15(17)	74 (83)	89(34)
1-5 years	20(18)	91(82)	111(42)
> 5 years	1(2)	62(98)	63(24)
Total	36(14)	227(86)	263(100)

Abbreviation: PIV, parainfluenza virus.

*Data are given as number (percent).

DISCUSSION

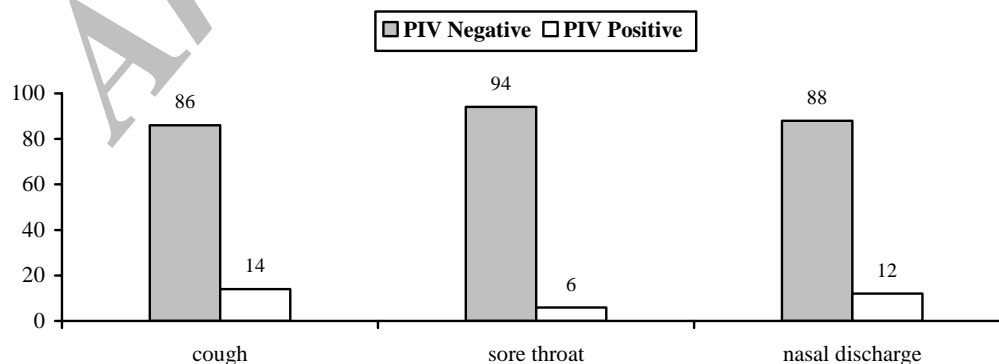
PIV is a well recognized cause of respiratory infection and unique amongst the most important human respiratory pathogenic viruses (2).

In a study conducted in Edinburgh, England between 1985 and 1995 on children below 14 years of age suffering from acute respiratory infections, PIV, respiratory syncytial virus and adenovirus were the most important recognized pathogens of the respiratory system in children (3). According to this study, the cause of 14% of

respiratory infections was PIV. In some studies the PIV is reported to be responsible for 17.5% of acute respiratory infections in children (4).

In the present study the PIV infection was seen to have significant statistical relation with the age, and majority of cases were seen in the age group of 1-5 years.

In a study conducted in Kuwait, about 80% of children with PIV infections were below six years (5). Also according to most of the scientific reports, majority the children with PIV infection fall in this (1-5 years) age group (2).

**Fig. 2.** Relative frequency of parainfluenza virus (PIV) infection with respect to clinical sign.

PIV in patients with respiratory infections

In this study no relationship was observed with regard to sex of the patients. With regard to season, majority of the cases were found in autumn and spring (13% in spring and 31% in autumn, $P < 0.0001$).

In this research PIV infection showed a strong and significant relation with croup ($P < 0.0001$) and bronchiolitis ($P < 0.0001$). With a failure rate of 10%, pharyngitis was also related to this infection ($P=0.075$). According to some sources, PIV type I has been recognized as the cause of 31% of cases of common colds, 21% of pharyngitis, 38% of otitis media, 16% of croup and 1% of bronchiolitis. Further, PIV type II has been reported to be the cause of 6% of croup and 9% of bronchiolitis cases; similarly PIV type III has been reported to be the cause of 5% of croup and 6% of bronchiolitis cases in children (6-12). In the present study PIV constitutes 43% of cases of bronchiolitis, 12% of pneumonia, 48% of croup, 21% of otitis, 9% of pharyngitis and 12% of rhinitis.

Considering the clinical signs, PIV with a failure rate of 10% and P of 0.057 was found to have a relation with sore throat. All other clinical signs including cough, tachypnea, respiratory distress, nasal discharge and fever showed no significant relation with PIV infection.

Altogether, this study shows that PIV is responsible for 14% of respiratory infections and plays an important role in lower respiratory infections. We came to the conclusion that in most respiratory infections there is no need for hospitalization and undue antibiotic therapy and imposing unnecessary costs on the patients.

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