

Research Article

Prevalence of raised IgE levels and absolute eosinophil count in bronchiolitis in children aged 2 months-2 years in tertiary care hospital

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ABSTRACT

Background: Bronchiolitis is defined by IAP as 'A constellation of clinical symptoms and signs including viral upper respiratory prodrome followed by increased respiratory effort and wheeze in less than 2 year old children'. Aim of the study was to study the prevalence of raised IgE levels and raised Absolute eosinophil count & RSV (respiratory syncytial virus) antigen by PCR in bronchiolitis between age group of 2 months - 2 years with the occurrence of wheeze after first episode in 1 year follow up.

Methods: 96 Children between 2 months - 2 years with first episode of bronchiolitis are included with the exclusion criteria of previous heart disease, lung disease, immune deficiency, second episode of bronchiolitis. In all the children CRP (C reactive protein), IgE (Immunoglobulin E), AEC (Absolute eosinophil count), RSV, PCR was done.

Results: Out of 96 children, 60 children (62%) are males with maximum incidence on subjects of 53 (55.2%) in age group 2-6months. Fever, cough and rhinorrhoea are the major presenting complaints apart from breathlessness. Among 96 children 37 children (38.5%) had high serum IgE out of which 17 developed wheeze in 1 year of follow up. 27 (28.2%) had raised AEC, out of which 10 had wheeze in follow up. Out of 10 children who had raised IgE and AEC, 3 had wheeze on follow up. 34 (35.4%) children had positive RSV PCR, 14 children had wheeze in follow up.

Conclusions: The prevalence of raised IgE, AEC and RSV PCR are 38.5%, 28.1% and 41.1% and the occurrence of wheeze on follow up was 45.9%, 37% and 41.1% respectively.

Keywords: Bronchiolitis, IgE, Absolute eosinophil count

INTRODUCTION

Bronchiolitis is defined by IAP as 'A constellation of clinical symptoms and signs including viral upper respiratory prodrome followed by increased respiratory effort and wheeze in less than 2 year old children'. Many virus cause bronchiolitis with Respiratory syncytial virus being common. Epidemiology of RSV has many unusual characteristics. They infect children nearly in first year of life with the peak incidence in 2-8 months. It is the only virus which cause most severe respiratory disease in the

first month of life when there is antibodies from the mother.¹ WHO estimated RSV burden globally as 64 million cases and 1,50,000 deaths every year. Peak incidences are at 2-8 months of age. This is one of the common causes of hospitalisation

Intensive care is needed for about 15% to 30% of RSV infections. Due to respiratory failure, apnoea 7% to 21% of hospitalised patient needs mechanical ventilation.² Some prospective study have suggested that RSV infection predisposes to blood eosinophilia and airway

hyperreactivity leading to development of wheeze. Overproduction of cytokines released by helper 2 T lymphocytes is responsible for illness especially interleukin 4 and 5. These are responsible for wheeze. Interleukin 4 and 5 cause migration of eosinophil and also increases IgE production.³

Etiology

Most common cause RSV (60-90%) followed by Enterovirus (17%) and Meta pneumo virus (7%). Mortality 1-3%, but 5-8% in congenital heart disease and 13% in chronic lung disease.¹⁴

Clinical features

Coryza, low grade fever, cough, crepitations with wheeze. Symptoms become severe during 3rd -5th day of illness. Within 3 weeks 90% of the cough subsides.¹⁴

Diagnosis

- Chest Xray (To rule out CHD, bronchopneumonia)
- RSV PCR (To confirm viral etiology)²

Aim

Primary aims of the study were to measure Serum IgE/AEC in patients with bronchiolitis and to obtain RSV burden as one of the etiology of bronchiolitis. And secondary aim was to proportion of wheeze among IgE patients.

METHODS

It was a cross sectional study, which was conducted in August 2014 to 15 in the department of Pediatrics on 96 children.

Inclusion criteria

Children between ages 2 months to 2 years got admitted for 1st episode of bronchiolitis.

Exclusion criteria

Previous H/o wheeze, H/o admission for respiratory tract illness, preexisting lung disease, preexisting heart disease and preexisting immuno deficiency.

Written informed consent taken from the parents of the study population. Ethical committee clearance obtained from institutional ethical committee. Patients with coryza, fever, cough and wheeze are classified as bronchiolitis clinically. Chest X ray, CBC taken. Blood for serum IgE is measured by electro chemi luminescence immunoassay. Normal value: 0-1 years 0-15 IU/ml; 1-5 years 0-60 IU/ml.

Eosinophil count is performed with diluting whole blood with a staining solution. The Phloxine B present in the diluting fluid stains only eosinophils red. All other leucocytes are preserved but not stained. The diluting specimen is charged onto a hemo cytometer for counting. Using low power objective, the eosinophils appear bright orange red and clearly distinguishable from neutrophils, basophils, lymphocytes and monocytes which do not stain. <350 cells / micro litre considered normal. Throat swab for RSV antigen is taken from posterior pharyngeal wall and transported to the lab through viral transport medium using cold chain and is measured by PCR. These patients are followed for a period of 1 year to find out the proportion of occurrence of wheeze in IgE positive patients.

Statistical analysis

The collected data analysed with SPSS 16.0 version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean and standard deviation were used for continuous variables. To find the significance in the categorical data Chi-square test was used. In the above statistical tool, the probability value of 0.25 is considered as significant level.

As seen out of 37 elevated IgE, 20 belong to 2-6 months; 16 of those 7-12 months and one of them is above 1 year. To determine the significance, Chi-square test was performed. The calculated P value was 0.624 (>0.05). Here the serum IgE with regards to age in the study population has not been found to be statistically significant.

As seen out of 27 elevated AEC, 11 were in 2-6 months, 11 were in 7-12 months and 5 above 1 year. To determine the significance, the calculated P value was 0.001 (0.01). Here the correlation between age and AEC has been found to bear a high statistical significance. RSV PCR was positive in 58.5% among 2-6 months followed by 7.8% among 7-12 months. The P value arrived was 0.001 (<0.01). Hence the correlation between RSV and age has been found to bear high statistical significance.

RESULTS

Age distribution

Out of 96 subjects, 53 (55.2%) were in age group 2-6 months followed by 7 months to 1 year with 38 patients and above 1 year with 5 patients.

Sex

Out of 96 subjects, who developed bronchiolitis, 62% (60) were males and 38% (36) were females with male to female ratio of 5:3

Complaints

Other than breathlessness, which is invariably presenting symptoms other presentation are Rhinorrhoea (11.4%) fever (31.2%), cough (16.6%), aspiration (16.6%), poor feeding (7.2%), excessive sleepiness (0.3%).

Chest X ray

Among 96 patients 45 patients showed normal xray 35 (36.4%). Hyper inflated lungs 11 (11.4%) and increased bronchovascular markings 5 (5.2%).

IgE

37 out of 96 subjects has raised IgE which accounts for 38.5% while remaining have normal values.

Estimation of IgE Levels

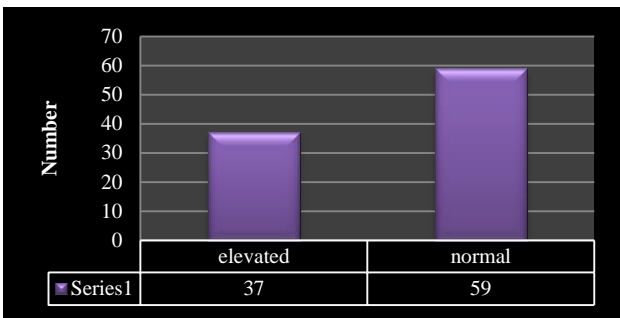


Figure 1: IgE levels.

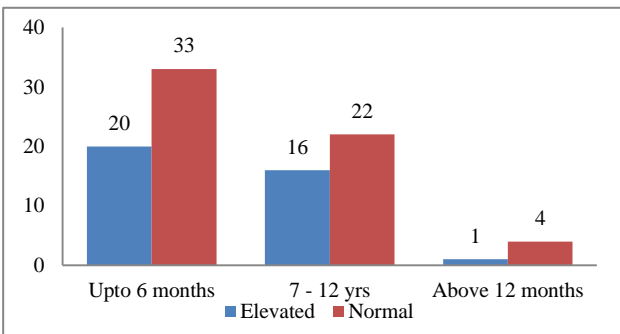


Figure 2: Serum IgE with age.

As seen in the above chart among 53 patients 20 had raised IgE levels in the age group of 2 to 6 months. In the age group of 7-12 months 16 had raised IgE levels and above 12 months 1 had raised IgE levels.

Serum IgE with age

Among 37 patients, 20 had increased IgE in the age group 2-6 months. 16 in 7-12 months and 1 above 12 months.

AEC

Out of 96 subjects 28.1% (27) had raised AEC levels. Rest 69 subjects had normal values. Among 26 with raised AEC, 20 in the age group <6 months, 6 in the age group of 7-12 months. Out of 27, 10 had wheeze on follow up.

RSV PCR

34 (35.4%) had RSV PCR positive. 31 patients falls in the age group less than 6 months, 3 patients in 7-12 months.

Wheeze among elevated IgE

Out of 37 patients, 17 (45.9%) developed wheeze after bronchiolitis on one year of follow up.

Absolute eosinophil count

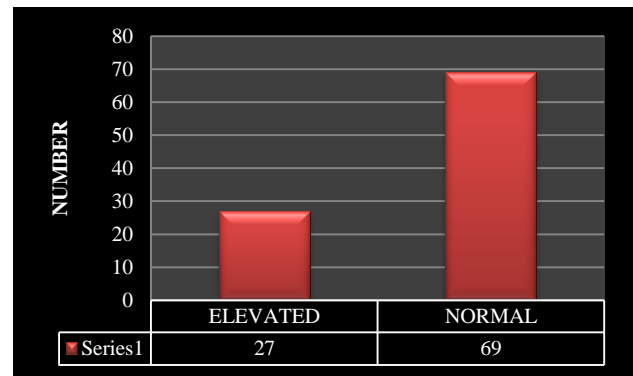


Figure 3: Absolute eosinophil count.

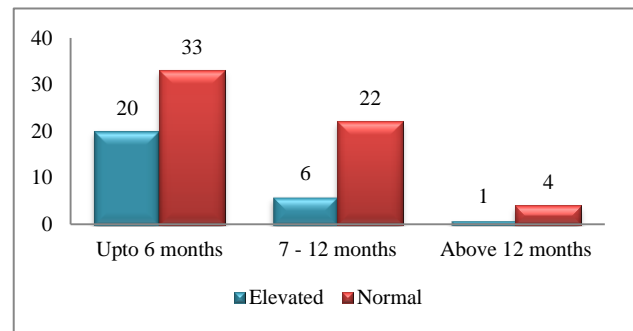


Figure 4: Comparison of absolute eosinophil count with age.

The above chart represents elevation of eosinophil count with age. As seen from above among 33 patients in less than 6 months 20 had raised levels and among age group of 7 to 12 months 6 had raised levels.

Occurrence of wheeze in bronchiolitis

Out of raised IgE in 37 patients, 17 had wheeze. Among 27 raised AEC, 10 had wheeze on follow up. With

normal value, 5 had wheeze on follow up. Out of subjects, 8 who have both IgE and raised AEC, 3 had wheeze on follow up.

RSV as an etiological agent in bronchiolitis

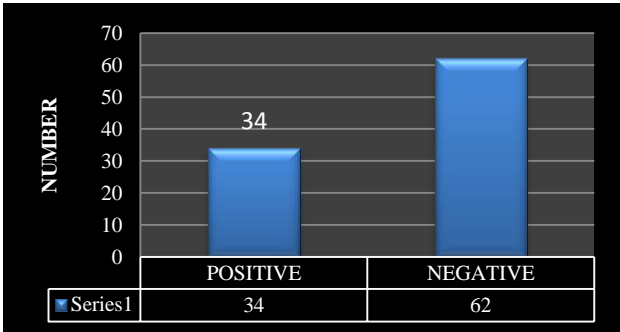


Figure 5: RSV antigen.

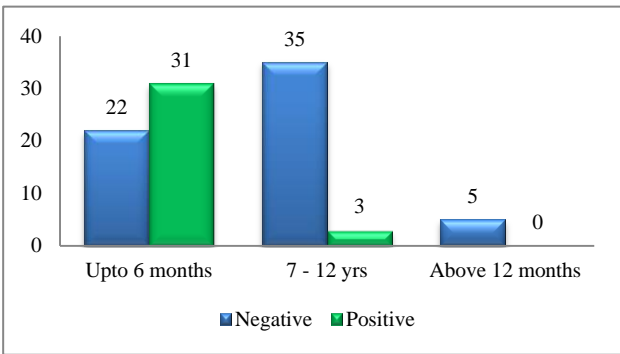


Figure 6: Relationship of RSV PCR with Age.

As seen from above chart RSV is more common in age group upto 6 months forming 32% followed by 7-12 months with 3%.

Viral bronchiolitis and subsequent wheeze

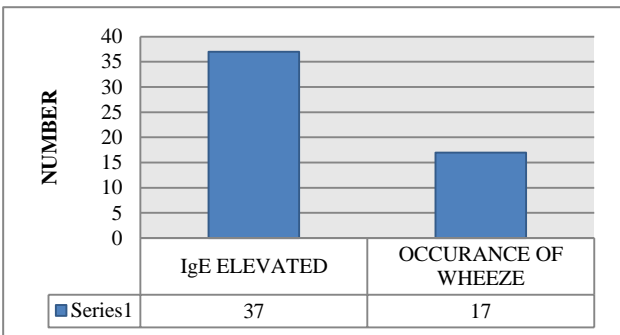


Figure 7: Proportion of occurrence of wheeze among elevated IgE on follow up.

This figure represents occurrence of wheeze among bronchiolitis children. Out of raised IgE levels in 37 patient 17 had wheeze. Among 27 raised absolute eosinophil levels 10 had wheeze on follow up. Among

the bronchiolitis children with normal values of IgE and Absolute eosinophil count 5 had wheeze on follow up. Out of the subjects who have both IgE and absolute eosinophil count raised 3 had wheeze on follow up.

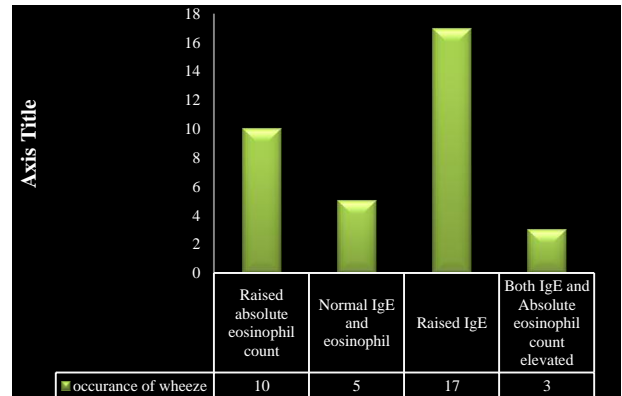


Figure 8: Occurrence of wheeze.

DISCUSSION

In present study, the prevalence of raised AEC was 28.1% and IgE levels in bronchiolitis (38.5%). RSV antigen was 35.4% as a causative factor and the proportion and occurrence of wheeze among IgE positive patients was 45.9%

Age distribution

In our study among 96 subjects, 55% fall under 2-6 months and 39% from 7-12 months. This is consistent with previous study by Chatterjee et al, Siguris et al, Jartti et al⁴ in which bronchiolitis was associated with lower age group (2-6 months)

Gender

In our study out of 96 subjects, bronchiolitis was more common in males (60%) compared to females. Similar results given by Boezen Hm, Jansen If et al³ boys had more risk of developing bronchiolitis than girls.

Incidence of RSV brochiolitis

In our study, RSV infection of 35.4% had high statistical significance. Similar studies conducted by Soham gupta, rajni et al who reported RSV infection among 22% of children. Broor et al reported 30% bronchiolitis with causative agent as RSV.^{7,8} We used amplification technique Reverse transcriptase RT-PCR. This was supported by Javed Akhtar etal.⁹

Chest X ray in bronchiolitis

In our study 36% of children had hyper inflated lungs which is similar to Javed akhtar et al stated 20-25% had hyperinflated lungs.⁹

IgE levels in bronchiolitis

According to Stephen et al measured IgE levels in 32 subjects.¹⁰ In his study 35% of them had IgE levels more than 95th percentile. Among 32 subjects, 17 were RSV positive. In our study, 38.5% had raised IgE levels and among 96 subjects, 34 (35.4%) were RSV positive. But it was statistically not significant. Similar study by Welliver et al had 72 infants with RSV bronchiolitis more than 25 subjects showed raised IgE levels.¹¹ And among them 17 had wheeze on follow up. In present study, among the raised IgE levels 37 subjects, 45% (17 subjects) of them acquired wheeze. Similar study was conducted by Singuris et al positive IgE test was seen in 32% of RSV bronchiolitis and 23% of them developed wheeze.¹²

Eosinophils in bronchiolitis

Kostas N. Priftis, Athina Papadopoulou et al found raised eosinophil level was significant in bronchiolitis.¹⁰ This was similar to our study in which though the raise is low it was statistically significant. Prevention is by immunoprophylaxis (Palivizumab) and recommendation of breastfeeding.

CONCLUSION

With regard to age distribution, higher incidence of bronchiolitis is seen in infant population 2-6 months; Higher incidence in males than female gender; Prevalance of increased AEC 27 (28.1%) they were correlated with age and is found to have high statistical significance; Prevalance of IgE in bronchiolitis 37 (38.5%) but did not have statistical significance; RSV antigen as a causative factor was 34 (35.4%) and had high statistical significance; The occurrence of wheeze was also analysed and was found to be statistically significant; The proportion of occurrence of wheeze among 46 positive patients was 45.9% .Out of increased IgE levels in 31 patients 17 had wheeze on follow up; Out of 27 raised AEC, 10 had wheeze on follow up; Among normal patients 5 had wheeze and out of 8, who have both IgE and AEC raised, 3 had wheeze on follow up.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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