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Original Research Article

Detection of *Chlamydia pneumonia* and *Mycoplasma pneumonia* in hospitalised children with community acquired pneumonia

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ABSTRACT

Background: *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* are atypical pathogens responsible for community acquired pneumonia (CAP) and are a leading cause of morbidity and mortality in low income countries. The study objective was to determine the prevalence of *C. pneumoniae* and *M. pneumonia* in hospitalized children with CAP.
Methods: This study was performed on ninety-four children admitted with radiologically confirmed diagnosis of pneumonia in Government Rajah Mirasudar Hospital, Thanjavur, during the period of July 2005 to April 2006. The diagnosis of infections with *C. pneumonia* and *M. pneumonia* was determined by detection of IgM antibody by using ELISA method. In this study clinical and radiological feature of these infections were also looked for.
Results: Among 94 children, 9 children (9.6%) were detected positive for *M. pneumonia* and 8 children (8.5%) were detected positive for *C. pneumonia*. Infection rate was highest among 5-12 years and least among 1 month to 24 months age group. The most common symptoms observed in patients with these pathogens are cough, fever, crepitations and rhonchi. Pulmonary infiltrates were the most common chest X-ray features of both *C. pneumoniae* pneumonia and *M. pneumoniae* pneumonia.
Conclusions: This study has shown that *C. pneumonia* and *M. pneumonia* play a significant role in paediatric CAP. Identification and confirmation of these organisms by IgM ELISA helps in better management that would decrease the need for hospitalization and IV antibiotics.

Keywords: *Chlamydia pneumonia*, Community acquired pneumonia, ELISA, *Mycoplasma pneumonia*

INTRODUCTION

Pneumonia is an inflammation of the parenchyma of the lung. Pneumonia is an important cause of morbidity and mortality in children. Estimates of United Nations Population Division place pneumonia as the first cause of death in children in developing countries.[1]

Bacteria and viruses are found in 60 80% of children with community acquired pneumonia (CAP).[2] *Mycoplasma pneumoniae* and *Chlamydiae pneumonia* are among the most important etiological agent in CAP causing primary atypical pneumonia.[3] Atypical pneumonias are characterized by gradual onset of constitutional symptoms and a begin course and has long been recognized as predominant form of pneumonia in children, military recruits, boarding schools and college students.[4] Few studies have shown mycoplasmal rates as high as 22% abroad and 15.5% in India, and 1-7.7% for *Chlamydia pneumonia*.[5,6] If these organisms are found to play a significant role in CAP, there would be significant change in the empiric therapeutic of broad spectrum antibiotics, many of which are ineffective against these organisms. The present study was done with the objective

determine the prevalence of *C. pneumoniae* and *M. pneumonia* in hospitalized children with CAP.

METHODS

This prospective study was carried out to evaluate the incidence *Chlamydia pneumonia* and *Mycoplasma pneumonia* infection in hospitalized children with community-acquired LRTIs. Ninety-four children with radiologically confirmed diagnosis of pneumonia admitted in Government Rajah Mirasudar Hospital, Thanjavur, during the period of July 2005 to April 2006 were selected in the study.

All children from the age of 1 month to 12 years admitted in paediatric ward with signs and symptoms of cough, fever, breathlessness, for less than two weeks duration and with chest X-ray showing evidence of pneumonia according to WHO criteria were included in the study. Exclusion criteria were children below one month of age, children who were admitted with other diseases, who subsequently developed pneumonia (nosocomial pneumonia).

Chest X-ray was taken for all the children and was classified according to the WHO criteria. Blood samples have been processed for serological tests for *Mycoplasma/Chlamydia pneumonia* within 48 hours of admission. IgM antibody levels for *Mycoplasma* and *Chlamydia pneumoniae* have been assayed using IgM Elisa method by using 2 different kits. IBl kit for IgM *Mycoplasma pneumonia* and Euroimmun kit for IgM *Chlamydia pneumonia*.[7,8] The tests were done in batches.

Statistical analysis

Quantitative variables were expressed as frequencies and percentages. Statistical analysis including Chi square and Fisher's exact test were performed using the Graph Pad Prism3 statistical (Graph Pad Sofware Inc., San Diego, USA).

RESULTS

In this study, ninety-four cases of community acquired pneumonia were evaluated for the presence of *Mycoplasma* and *Chlamydia pneumoniae* admitted in the department of paediatrics at Government Rajah Mirasudar Hospital, Thanjavur from the year 2005-2006.

Table 1: Age and sex distribution of study population.

Demographic characteristics	Total no. of patients (n = 94)	*M. pneumonia* (n = 9)	*C. pneumonia* (n = 8)
Sex			
Male	62 (66)	4 (44.4)	4 (50)
Female	32 (34)	5 (55.5)	4 (50)
Age			
<24 months	65 (69.1)	5 (55.5)	4 (50)
25-60 months	23 (24.5)	3 (33.3)	3 (37.5)
61-144 months	6 (6.4)	1 (11.1)	1 (12.5)

Table 2: Signs and symptoms in both M./C. pneumonia cases.

Clinical symptoms	M. pneumonia (n=9)			C. pneumonia (n=8)		
	IgM positivity (n = 9)	IgM negativity (n = 85)	P value	IgM positivity (n = 8)	IgM negativity (n = 86)	P value
Fever	8 (88.9%)	76 (89.4%)	0.961	8 (100%)	76 (88.4%)	0.368
Cough	9 (100%)	78 (91.8%)	0.371	8 (100%)	79 (91.8%)	0.402
Breathlessness	6 (66.7%)	79 (92.9%)	0.011	5 (62.5%)	80 (93%)	0.005
Wheeze	2 (22.2%)	29 (34.1%)	0.470	2 (25%)	29 (33.7%)	0.616
Vomiting	1 (11.1%)	9 (10.6%)	0.961	1 (12.5%)	9 (10.5%)	0.858
Ear discharge	0	1 (1.2%)		0	1 (1.2%)	
Cervical lymphadenopathy	4 (44.4%)	10 (11.8%)	0.009	0	14 (16.3%)	0.216
Cyanosis	0	11 (12.8%)		0	11 (12.8%)	0.288
Crepitations	8 (88.9%)	80 (82.7%)		7 (87.5%)	81 (93.7%)	0.635
Rhonchi	8 (88.9%)	73 (80%)	0.635	6 (75%)	75 (86.80%)	
Bronchial breathing	1 (11.1%)	19 (20%)		1 (12.5%)	19 (20%)	
Pleural effusion	0	1		0	1	
Empyema	0	0		0	0	

Table 1 presents the demographic distribution of the study population. In this study the total number of children less than 24 months was 65 (69.1%), the number of children between 25-60 months was 23 (24.5%) and the number of children between 61-144 months was 6 (6.4%). Male: Female ratio was 1.9:1 and the percentage of male and female children was 66% and 34% respectively.

Among the 94 children admitted with the diagnosis of pneumonia, 9 children were detected positive for IgM antibody against *M. pneumonia* and 8 children were detected positive for IgM antibody against *C. pneumonia*. The most common age group affected with *M. pneumonia* and *C. pneumonia* was <24 months 55.5% and 50% respectively.

The most common symptoms observed in patients with these pathogens are cough, fever, crepitations and rhonchi. For patients with samples positive for *M. pneumoniae*, both cough was seen in all cases (100%) followed by fever, crepitations, and rhonchi in each 8 (88.9%) cases, breathlessness in 6 (66.7%) cases and cervical lymphadenopathy in 4 (44.4%) cases; however only cervical lymphadenopathy and breathlessness was statistical significant for this group with values of p=0.009 and p=0.01 respectively when compared with IgM negative cases.

Table 3: Diagnostic findings in in both Mycoplasma/Chlamydia pneumonia cases.

Diagnostic findings	M. pneumonia (n=9)		C. pneumonia (n=8)	
Total leucocyte count (>10000)	**IgM positivity (n=9)**	**IgM negativity (n=85)**	**IgM positivity (n=8)**	**IgM negativity (n=86)**
56 cases	5 (55.6%)	51 (60.0%)	4 (50.0%)	52 (60.5%)
Chest X-ray findings				
Pulmonary infiltrates	8 (88.9%)	65 (76.5%)	7 (87.5%)	66 (76.7%)
Consolidation	1 (11.1%)	19 (22.4%)	1 (12.5%)	19 (22.1%)
Pleural effusion	0	1 (1.2%)	0	1 (1.2%)

In patients with *C. pneumonia*, cough and fever occurred in all cases (100%). Breathlessness was found to be less common in IgM positive cases (62.5%) when compared to that of IgM negative cases (93.0%) with statistically significant value (p=0.005). 7 (87.5%) children had creptations and 6 (75%) children had rhonchi. One (12.5%) child had bronchial breathing.

As shown in Table 3, total leucocyte count of >10,000 occurred in 55.6% and 50% of IgM positive cases in *M. pneumonia* and *C. pneumonia* population respectively. Chest X-ray showed pulmonary infiltrates in 88.9% and *87.5%* of children with *M. pneumoniae* and *C. pneumonia* infections respectively. Consolidation was seen in 11.1% and 12.5% of children correspondingly. None of the cases had pleural effusion.

DISCUSSION

In the present study, ninety-four children admitted with radiologically confirmed diagnosis of pneumonia in the Paediatric department at Government Rajah Mirasudar Hospital, Thanjavur during the period July 2005 to April 2006 were included.

Nine children (9.6%) were detected positive for *M. pneumoniae* and eight children (8.5%) were detected positive for *C. pneumoniae*. This correlates with other studies done by Foy et al on *M. pneumoniae* and by Chaudry on *C. pneumoniae*.[9,10]

In this study, children with *M. pneumonia, C. pneumoniae* infections had median ages of 4 years (range 10 months to 12 years) and 3 years (range 7 months to 12 years) respectively, indicating that preschool aged children have at least as many episodes of atypical pneumonia as older children. These findings corroborate with those of previous studies done by Block et al in paediatric community acquired pneumonia and by Michelow in Texas.[11,12]

In the study, *M. pneumoniae* and *C. pneumoniae* infections were lowest among 5-12 years age group with 11.1% and 12.5% respectively and highest among 1 to 24 months age group 55.5% and 50% respectively. The difference was not statistically significant, in view of small number of positive cases. These values had also been observed in the study of Foy et al which included adults and showed that *M. pneumonia* infection is common in children in 5-9 years group (13%) and less common in 0-4 years group (3%).[13] Other study by Saikku et al in Fillipino children in 1981 isolated *C. pneumoniae* infection in 10% of the children in the 2-5 years age group and 5% in those less than 2 years of age.[14]

In the present study, no statistically significant difference was found in the antibody positivity for these two organisms among male and female. Along with radiologically confirmed pneumonia, cough constituted the main symptom in all children with *M. pneumoniae*

and *C. pneumoniae* infections (100%). Fever and breathlessness occurred in 88.9% and 66.6% of mycoplasma infection and 100% and 62.5% of *C. pneumoniae* infection respectively. Breathlessness was the only symptom which was found to be lower in both *M. pneumoniae* (66.6%) and *C. pneumoniae* (62.5%) positive groups when compared to that of negative groups with 92.9% and 93% for *M. pneumoniae* and *C. pneumoniae* respectively. Statistically significant difference was found among the positive and negative groups with p value of <0.05. This co-relates with other studies, by Del Valle-Mendoza.[15] Cervical adenopathy was the only clinical finding which was found to be significantly higher in the *M. pneumoniae* positive group. This has been discussed in a study done by Del Valle-Mendoza et al which showed an incidence of 2.94% for cervical adenopathy.[15]

As per the WHO criteria, presence of cyanosis suggests severe and very severe pneumonia. Absence of cyanosis in both *M. pneumoniae* and *C. pneumoniae* infections suggests mild course of the disease caused by these organisms. Rales and rhonchi were common and bronchial breathing was uncommon in both *M. pneumoniae* and *C. pneumoniae* positive group with 11.1% and 12.5% respectively. This indirectly suggest that clinically, consolidation was less common in both *M. pneumoniae* and *C. pneumoniae* infections.[16]

The leucocyte count was higher in our study *C. pneumonia* cases as compared to *M. pneumonia*. On contrast to this in a study by Puljiz et al the mean leucocyte count was similar in both groups of patients.[17]

Numerous studies indicate that radiographic manifestations of *C. pneumoniae* resemble those in patients with *M. pneumoniae* pneumonia.[18-20] In our study, radiological findings of pulmonary infiltrates that includes both interstitial and alveolar infiltrates were similar in both *M. pneumoniae* and *C. pneumoniae* infections whereas consolidation and pleural effusion were less common in positive groups.

CONCLUSION

This finding of the study confirmed that *M. pneumoniae* and *C. pneumoniae* play a significant role in community acquired pneumoniae in Indian children. Since these cannot be identified and confirmed by clinical/radiological features, rapid specific diagnostic test IgM ELISA should be used in the evaluation of community acquired pneumonia. These tests are rapid, feasible and help in better management as currently used empirical regimen for the treatment of CAP does not cover these organisms. Identification of these organisms would decrease the need for hospitalization and IV antibiotics.

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