



Differentiation of Bacterial and Viral Pneumonia in Children by Hematological Investigations

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ABSTRACT

Objective: To differentiate bacterial and viral community acquired pneumonias using WBC count (TC), differential count (DC), erythrocyte sedimentation rate (ESR).

Design: Descriptive Study

Setting: Semi-Urban tertiary care hospital

Methods: 100 cases of children aged between 1 month to 12 years who were admitted to paediatric wards with tachypnoea as per WHO criteria and chest in drawing in Rajah Muthiah Medical college, Chidambaram were included in the study. Detailed history, physical examinations were recorded in a proforma. Investigations included WBC count, DC, ESR, Chest X ray. Children who had radiologically confirmed pneumonia (86 cases) were divided into bacterial and viral pneumonia based on their radiological findings. These results were correlated with laboratory findings and results were given.

Results: In the present study, radiological findings were present in 86% of cases. Bacterial pneumonia was detected in 73%, viral pneumonia in 13%. Among bacterial pneumonia, bronchopneumonia was seen in 34% cases, consolidation was seen in 26%, alveolar infiltrate in 6% and complications of pneumonia in 7% cases. In the present study, among bacterial pneumonias defined radiologically, 63% had elevated WBC count, 79% had neutrophilia, 76.7% had elevated ESR. There was no correlation of laboratory findings with bacterial and viral pneumonia defined radiologically (low sensitivity and specificity).

Conclusion: Routine hematological investigations like WBC count, DC, ESR aid very little in differentiating bacterial and viral pneumonias. Chest X-ray is valuable aid in the diagnosis of pneumonia in children. Follow up chest roentgenogram is vital for evaluating the response to treatment in pneumonia.

Keywords: Pneumonia, Bacterial, Viral, WBC count, DC, ESR.

Introduction

Acute Respiratory infections (ARI) in young children is responsible for 3.9 million deaths every year worldwide. About 90% of ARI deaths are due to pneumonia which is bacterial in origin. The incidence of pneumonia in children < 5 years in developing countries is 0.28 episodes per child-

year (150 million/year), compared to 0.05 episodes per child - year in developed countries. In India, in the year 2013, about 31.7 million cases of ARI were reported. During 2013 about 3,278 children died of ARI and 2,597 died of pneumonia. Pneumonia was responsible for about 18% of all under 5 deaths in India. This study was done to

investigate various radiological findings associated with childhood community acquired pneumonias and to determine the diagnostic role of WBC count, DC, ESR in differentiating bacterial and viral pneumonias.

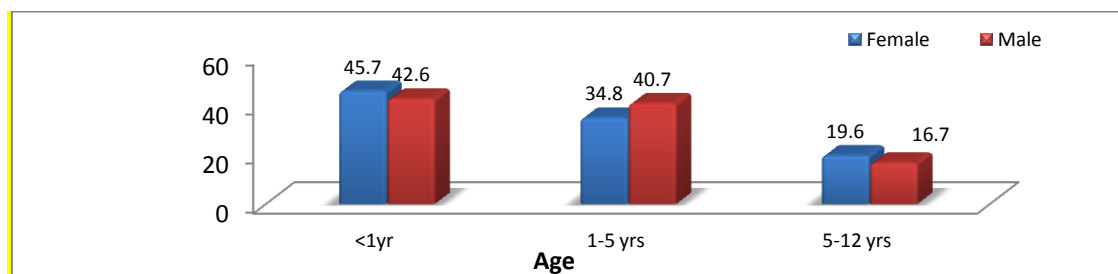
Materials and Methods

This was a descriptive clinical study of pneumonia conducted on 100 children who were admitted to pediatric wards in Rajah Muthiah Medical college, Annamalai University, Chidambaram during November 2014 to August 2016. Children between 1 month-12 years presenting with clinical features of tachypnoea as per WHO criteria and chest in drawing in study period were included. Children with congenital anomalies of heart and lungs, anatomical defects like cleft lip and palate, immune compromised states like HIV, children on immunosuppressant drugs, children whose symptoms got relieved after three doses of bronchodilator therapy were excluded. A detailed history of the relevant symptoms such as fever, cough, rapid breathing, refusal of feeds etc was taken. A detailed general examination of each child including anthropometry was carried out.

Detailed systematic examination was done. Investigations included WBC count, DC, ESR, Chest X ray. Children who had radiologically confirmed pneumonia (86 cases) were divided in to bacterial and viral pneumonia based on their radiological findings. These results were correlated with laboratory findings and results are given.

Results

The most affected children belonged to the age group of 1 month -5year (82%). Males outweighed females with male to female ratio of 1.17:1. Rapid breathing (100%), cough (100%) and fever (99%) were the most common symptoms. Refusal of feeds was present in 24% cases. Tachypnoea (100%), chest retractions (100%) and crepitations (82%) were the most common signs. Bacterial pneumonia was detected radiologically in 73% and viral pneumonia in 13% of cases. Chest X-ray was normal in 14% of cases. Among bacterial pneumonia, bronchopneumonia was seen in in 34% cases, consolidation in 26%, alveolar infiltrate in 6% and complications of pneumonia in 7% cases.



Age and sex distribution

Radiological findings

Diagnosis	No.	Percentage
BACTERIAL PNEUMONIA	73	73%
A) Bronchopneumonia	34	34%
B) Lobar consolidation	26	26%
C) Alveolar Infiltrates	06	6%
D) Complications	07	7%
VIRAL PNEUMONIA	13	13%
Normal	14	14%

80% of cases showed complete radiological resolution after treatment. On investigation, 60% had leucocytosis. Neutrophilia was seen in 72% and lymphocytosis in 10% of cases. ESR was elevated in 69% of cases. In the present study, among bacterial pneumonias defined radiologically, 63% had elevated WBC count 79% had neutrophilia, 76.7% had elevated ESR. There was no correlation of laboratory findings with bacterial and viral pneumonia defined radiologically (low sensitivity and specificity).

Laboratory findings in comparison with radiologically positive pneumonia:

Findings	Total (radiological[B+V])	Bacterial (73)(B)	Viral (13)(V)	Sensitivity (%) (bacterial)	Specificity (%) (bacterial)
WBC >15000/m ³	86	46	5	63%	61.5%
DC Neutrophilia	86	58	6	79%	53.8%
ESR >20mm/hr	86	56	6	76.7%	53.8%

Discussion

Although clinical symptoms and signs are helpful indicators of the presence of disease as well as etiology, radiographic investigation is often used to confirm a clinical diagnosis and to help sort out whether or not antibiotics or more extensive work up is necessary.

Radiological findings

In our study Chest x-ray showed radiological changes consistent with pneumonia in 86% of cases. This was in comparison with CDC EPIC study (89%).

Evidence of bacterial infection was found in 73% and viral in 13% of cases. In a study conducted by Virkki R et al, it was found that radiological changes were seen in 85%, with evidence of bacterial infection in 64% and viral in 36% of cases. Macintyre C. R. et al have also reported radiological confirmation in 85% of cases of pneumonia.

The reasons for higher incidence of radiologically detected bacterial pneumonia in our study may be due to high incidence of bacterial pneumonia in countries like ours. Also there may be variations in intra observer and inter observer agreement on the radiographic features used for interpreting the radiogram.

In our study, follow up radiographs were taken in 60% of cases; 80% showed complete resolution after treatment and 20% partial resolution. Heaton P et al, in their study on utility of chest radiography in the follow up of pneumonia, has found that 90.2% had normal chest radiographs after treatment. They also concluded that in cases of uncomplicated pneumonia, follow up chest radiography is not indicated if symptoms and signs are absent.

Laboratory investigations

Routine investigations like white blood cell count (WBC), differential count (DC) and erythrocyte sedimentation rate (ESR) may provide a clue in differentiating bacterial from viral pneumonia.

Our observation shows that WBC count, neutrophilia (DC) and elevated ESR aided very little to differentiate bacterial from viral pneumonia (low sensitivity and specificity). This was in comparison with studies done by Don M et al, Hoshina T et al, Korppi M et al, Virkki R et al, Drummond P et al.

Conclusion

Routine hematological investigations like WBC count, DC, ESR aid very little in differentiating bacterial and viral pneumonias. Chest X-ray is valuable aid in the diagnosis of pneumonia in children. Follow up chest roentgenogram is vital for evaluating the response to treatment in pneumonia. All children with radiologically confirmed pneumonia should be started with antibiotics as it is difficult to distinguish bacterial from viral pneumonia using basic hematological investigations.

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