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Original Research Article

Correlation of bacteriological, radiological and clinical findings in children with pneumonia

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Abstract

Introduction: In young children, it was reported that respiratory tract is the significant cause for infections as well as death. A study was conducted to find the bacteriological and radiological findings and correlation with clinical findings in children with pneumonia.

Materials and Methods: Study was conducted in GSL Medical College. Study protocol was approved by institutional ethics committee. Informed consent was collected from the parents / guardians of all the study participants. Children in the aged 1 to 5 years with clinical signs suggestive of pneumonia were included. Clinical and radiological finding were recorded. Radiological findings also used to categorize bacterial and viral pneumonia. $P< 0.05$ was considered statistically significant.

Results: Total 94 participants were included, female male ratio was 58:36. In this report, 86% were bronchopneumonia, 12% lobar pneumonia and 2% empyema; bacterial pneumonia was diagnosed in 44% cases, viral pneumonia in 52% and 4.3% were diagnosed to be normal. Tachypnoea (95.74%), chest retractions (100%), crepitations and ronchi (100%), abnormal breath sounds (100%) correlated well with positive radiological findings. Crepitations alone and ronchi alone has least correlation.

Conclusion: Pneumonia is one of the major causes of lung infection of children. The radiological findings are very essential for diagnosis of pneumonia

Keywords: Infection, Pneumonia, Respiratory.

Introduction

In young children, it was reported that respiratory tract is the significant cause for infections as well as death.[1] Age wise, among the children < 5 years, significant deaths were reported because of lower respiratory tract infections (LRTI).[2] Hence not only the diagnosis, treatment even prevention of LRTI also very important.

As per the World health organization (WHO) report, signs and symptoms such as rapid breathing also important in infants and young children.[3] These have to be considered not only for early diagnosis and also for prompt treatment of pneumonia. Surely this will help in controlling the death as well as infection rate.

Due to difficulty to establish the etiology, symptomatic antimicrobial therapy is being practiced worldwide for pneumonia. But, either clinical or radiological diagnosis would not help the treating specialist to confirm etiology of childhood pneumonia.[4]

Though acute respiratory tract infections (ARIs) are preventable, but high populated country's such as India, socio environmental factors are the major obstacles in prevention of these. Moreover, information such as risk factors is also limited. There is a significant gap among these factors, which needs to be fulfilled by systematic studies. With these, study was designed to find the bacteriological and radiological findings and correlation with clinical findings in children with pneumonia.

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Materials and Methods

Study was conducted in GSL Medical College. Study protocol was approved by institutional ethics committee. Informed consent was collected from the parents / guardians of all the study participants.

Children in the aged 1 to 5 years with clinical signs suggestive of pneumonia were included in the study, as per WHO guidlines.[5] Children with congenital anomalies of heart and lungs, anatomical defects such as cleft lip and cleft palate, immune compromised states like human immune deficiency virus infection (HIV) and children less than one year of age were excluded from the study.

A detailed history of the relevant symptoms such as fever, cough, rapid breathing, refusal of feeds, noisy breathing and bluish discolouration were considered. Based on WHO ARI criteria, children with tachypnea were considered.

A detailed examination including anthropometry was carried, findings were recorded. Children were classified as pneumonia, severe pneumonia and very severe pneumonia. Various blood investigations such as hemoglobin percentage, total as well as differential WBC counts, ESR were done in all cases. Chest X-ray, blood culture was done for all the participants. Based on radiological findings, children were divided into Bacterial (consolidations, alveolar infiltrates) and Viral (interstitial infiltrates, hyper aeration) pneumonia.

Statistical analysis

Chi square test was used to determine significant differences between three groups; $P< 0.05$ was considered statistically significant.

Results

Total 94 participants were included, female male ratio was 58:36; majority (65%) were less than three years of age. Infection wise, 27 (29%) were pneumonia, 51(54%) were sever pneumonia and 16(17%) were very sever pneumonia. 86% were diagnosed as bronchopneumonia, 12% lobar pneumonia and 2% empyema. Bacterial pneumonia was diagnosed in 44%(41) cases, viral pneumonia in 52%(49) cases and 4(4.3%) were diagnosed to be normal. Tachypnoea (95.74%), chest retractions (100%), crepitations and ronchi (100%), abnormal breath sounds (100%) correlated well with positive radiological findings. Crepitations alone and ronchi alone has least correlation.

Discussion

As per the literature, age is an important cause for infections of respiratory tract as well as death especially in pediatric group. In the present study, majority (64.9%) were less than three years of age, Drummond P et al.,[6] and Sehgal V et al[16] also reported similar findings. The female male ratio was 1.61; 62% were girl children. The reason for this was not reported in the literature. However Hamid.M et al,[7] and Rahman et al.[8] Also reported more girl children.

Abnormal rapid breathing, tachypnoea is considered to be important indicator of the pneumonia. Also the traditional, method of making a clinical diagnosis of pneumonia has been done by the recognition of auscultatory signs, in particular crepitations, in a child with cough. In this study also tachypneoa followed by chest retractions were the diagnosed to be the important observations for clinical diagnosis of pneumonia; All the patients exhibited tachypnoea and 73% exhibited chest retractions. In this report, 78% cases, crepitations and ronchi was also observed, similarly, Reddaiah VP et al., [11] reported 76%. In the available literatures also, tachyponea was reported to be very important clinical symptom for the diagnosis of pneumonia by Gupta D et al.[9], Margolis P et al.[10]

Infection wise, in this study, 86.2% were diagnosed as bronchopneumonia, 12.7% lobar pneumonia and 2.1% were diagnosed to be pneumonia with complications. Similar findings were reported by Reddaiah VP et al.,[11] also; the rate of infections were 64%, 6.4%and 4%, respectively, bronchopneumonia, lobar pneumonia and post measles bronchopneumonia.

Usually, radiological diagnosis helps in the confirmation of the clinical diagnosis and clinical symptoms and signs exhibited by the patients are useful markers to identify the presence of infections. In this study, 95.74% cases, changes suggestive of pneumonia were detected in chest x-ray; in this 43.6% were found to be bacterial infection and 52.1% viral infections.

Kerry-Ann FD' Grady et al.[12] studies showed that CXR is the gold standard for confirmation of childhood pneumonia with evidence of radiological findings in 92% of cases. They also showed that CXR is a valuable aid in pediatric pneumonia by giving the pattern, location and extent of infection. Bacterial pneumonias show distinctive patterns on CXR namely consolidation (alveolar / lobar pneumonia), bronchopneumonia (peri bronchial nodules) and ground-glass opacity.

In one study, 85% cases, the radiological evidence for pneumonia was reported by Virkki R et al,[13]; in this 64% were found to be bacterial infection and 36% viral infections. Radiologically, similar findings were reported by MacintyreC. R et al.[14]; in this study the authors reported radiology helped in confirmation of 85% of cases of pneumonia.

In this study, when the clinical data was compared with radiological findings, tachypnoea (95.74%), chest retractions (100%), crepitations with ronchi (100%) and abnormal breathe sounds (100% bronchial breathing, diminished breath sounds) correlated well with positive findings. Crepitations and ronchi alone had least correlated findings. In the available studies also, tachypnoea was reported to be highest radiological abnormality among the pneumonia cases by Zukin DD et al.[15] the physical examination finding of chest such as crepitations, abnormal breath sounds comprised were reported as highest chances to declare pneumonia infection. of a high-risk group, which increased significantly the likelihood of pneumonia. Studies done by Lindsey K Grossman et al.[16] showed the overall clinical impression was more important than individual signs/symptoms in predicting the radiological diagnosis.

Conclusion

Pneumonia is one of the major causes of lung infection of children. The radiological findings are very essential for diagnosis of pneumonia. Studies with large sample size by considering socioeconomic data, nutritional status is recommended.

Source of Funding

None.

Conflict of Interest

None.

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