

A Clinical Study of Evaluation of Blood Cultures in Paediatric Patients of Community Acquired Pneumonia

C Ratna Kishore

Associate Professor, Department of Paediatrics,
Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh, India.

Article History

Received: 21 Oct 2015

Revised: 07 Nov 2015

Accepted: 28 Nov 2015

*Correspondence to:

Dr. C Ratna Kishore
Associate Professor,
Department of
Paediatrics,
Rajshree Medical
Research Institute &
Hospital, Bareilly,
Uttar Pradesh, India.

ABSTRACT

Background: Children are frequently hospitalised because of community acquired pneumonia. It also increases the healthcare finances for the patient and medical companies. A vast variety of treatment options are available for community acquired pneumonia. The aim of the present study is to assess blood cultures amongst paediatric patients of community acquired pneumonia and find its association with positive disease detection.

Materials and methods: The present retrospective study was conducted in the Department of Paediatrics, Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh (India) during a period of one year. Group I patients were treated patients in them blood culture was done and patients in whom blood culture was not done were placed as control i.e. Group II. Group I patients were matched with Group II patients in using random sampling. Chi square test or fischer's test were used for analysis. Linear regression was used for assessing Continuous variables. SPSS software was used for analysis.

Results: Blood cultures of 100 patients were obtained. About 3 children (3%) had positive blood culture, 2 for streptococcus pneumonia and 1 for non typable strain of haemophilus influenza. Around 39% in blood culture group received antibiotics before admission to hospital and 35.7% children in whom blood culture was not obtained received antibiotics.

Conclusion: Blood culture not always leads to identification of causative organism due to high chances of false positive cultures. According to this study we need to refine the association between blood culture and community acquired pneumonia.

KEYWORDS: Antibiotics, Community, Haemophilus, Pneumonia.

INTRODUCTION

Children are frequently hospitalised because of community acquired pneumonia. It also increases the healthcare finances for the patient and medical companies. A vast variety of treatment options are available for community acquired pneumonia.^{1,2} Various strict norms have been put for the management of community acquired pneumonia by infectious disease society of America. Collection of blood cultures amongst all the patients who require hospitalization is one such norm.³ However certain criteria's need to be followed obtaining blood cultures is not often followed.⁴ but since they do not identify the all the organisms they are of limited utility.⁵⁻⁷ However the overall prevalence of bacteremia reported amongst children is 7%.⁸

There have been various studies that demonstrate that diagnostic tests leads to a rise in hospital revisit rate but

do not bring about significant change in the clinical management of the patient.⁹ Even various studies have shown that the incidence of positive cultures is less and it has less sensitivity in detecting bacterial pneumonia.^{10,11} The aim of the present study is to assess blood cultures amongst paediatric patients of community acquired pneumonia and find its association with positive disease detection.

MATERIALS AND METHODS

The present retrospective study was conducted in the Department of Paediatrics, Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh (India) during a period of one year. The study was approved by the institute's ethical committee and a written consent was obtained for collecting patient's data.

Confidentiality of the patients was maintained and data was anonymously arranged before tabulating and analysing it. The complete information was collected from the medical records of the hospital. Patient's aged between 4 months to 17 years who were healthy and were admitted to the for community acquired pneumonia were included in the study. Patients who were identified with pneumonia at the time of discharge or at the time of admission were also included. Patients with any associated medical condition like chronic neuromuscular problem, respiratory, gastrointestinal, congenital abnormality or malignancy were excluded from the study.

Patient's data like demographic data were collected. All the diagnostic tests, antimicrobial tests and therapeutic procedures were performed. Information was also

obtained about child's vaccination. Pneumococcus vaccine, hemophilus influenza type b vaccine was given chief importance. If the culture showed growth of a microorganism that was unlikely a pathogen in healthy children like corynebacterium then it was considered false positive, if the culture showed growth of numerous bacteria that were present over contaminated skin then also it was considered false positive.

Group I patients were treated patients in them blood culture was done and patients in whom blood culture was not done were placed as control i.e. Group II. Group I patients were matched with Group II patients in using random sampling. Chi square test or fisher's test were used for analysis. Linear regression was used for assessing Continuous variables. SPSS software was used for analysis.

Table 1: Characteristics of children hospitalised for pneumonia

VARIABLE	Culture (n=100)	No culture (n=70)	Matched culture Population (n=80)	Matched no culture pseudo-population (n=80)
Age	6.8(3.4)	5.6(3.5)	5.7(3.2)	5.7(3.6)
male gender	55(55%)	36(51.4%)	43(53.5%)	39(48.7%)
Preceding illness (days)	5.4(3.2)	5.2(3.1)	5.2(4.3)	6.5(5.1)
Received antibiotics pre-admit	39(39%)	25(35.7%)	30(37.5%)	31(38.7%)
Met SIRS criteria at presentation†	88(88%)	59(84.2%)	71(88.8%)	68(85%)
Received supplemental oxygen at presentation	51(51%)	36(51.4%)	41(51.2%)	40(50%)
Pleural effusion identified	57(57%)	44(62.8%)	46(57.5%)	51(63.7%)

Table 2: Variables associated with blood cultures

VARIABLE	Unadjusted odd's ratio	Adjusted odd's ratio
Age	0.95(0.98-1.22)	1.03(0.91-1.24)
male gender	0.87(0.82-1.04)	0.95(0.84-1.27)
Preceding illness (days)	1.02(0.92-1.55)	0.86(0.74-1.34)
Received antibiotics pre-admit	1.23(0.96-1.82)	1.37(0.87-1.79)
Met SIRS criteria at presentation†	1.32(0.84-2.66)	1.64(0.92-2.99)
Received supplemental oxygen at presentation	0.92(0.86-1.20)	0.86(0.62-1.08)
Pleural effusion identified	0.80(0.65-1.44)	0.63(0.42-1.14)

RESULTS

A total of 228 children met the inclusion criteria. But 28 children were excluded from the study because of the presence of complex chronic condition.

Table 1 shows the demographic data and the characteristics of children hospitalised for pneumonia. Blood cultures of 100 patients were obtained. About 3 children (3%) had positive blood culture, 2 for streptococcus pneumonia and 1 for non typable strain of haemophilus influenza. Around 39% in blood culture group received antibiotics before admission to hospital and 35.7% children in whom blood culture was not obtained received antibiotics. There were 88% children who met the SIRS criteria at the time of presentation in the blood culture group. There was no significant difference amongst the factors that were assessed in this

study. Thus suggesting that matching procedure was successful. Table 2 describes the association between the selected criteria and the decision of obtainment of blood culture. The factors associated with increased odd's ratio include patients receiving antibiotics (1.23, 95% CI 0.96-1.82), patient's who met SIRS criteria at the time of presentation (1.32, 95% CI 0.84-2.66).

DISCUSSION

In our present study, various factors have been identified to be associated with obtaining blood cultures. Studies performed by Tayima T et al¹² and Leibowitz et al¹³ in the past comparing the clinical, laboratory and radiographic criteria for community acquired pneumonia showed similar results. The most commonly isolated

microorganisms in children with community acquired pneumonia were streptococcus pneumonia, haemophilus influenza. In our study increased odd's ratio for blood culture was found in the below mentioned criteria. These are administration of antibiotics prior to hospital admission, consistence with SIRS criteria. As per the study conducted by by Neuman MI et al¹⁴ over managing childhood pneumonia in US, showed that admission to hospital emergency department was associated with increased odd's ratio for blood culture. American Thoracic Society recommends blood culture as a part of initial evaluation of patients with community acquired pneumonia.¹⁵

According to WHO, presence of cough and tachypnea are the criteria that define mild to moderate community acquired pneumonia.^{16,17} But this criteria is of lesser use as the symptoms of most of lower respiratory tract infections are same. Study by Kurz H et al¹⁸ reported the presence of contaminants while blood culture were obtained. The present study was associated with certain limitations like the frequency of children with blood culture admitted to ICU were quite high compared to other groups. Blood culture time was also not available.

CONCLUSION

Blood culture not always leads to identification of causative organism due to high chances of false positive cultures. According to this study we need to refine the association between blood culture and community acquired pneumonia.

REFERENCES

1. Florin TA, French B, Zorc JJ, Alpern ER, Shah SS (2013) Variation in emergency department diagnostic testing and disposition outcomes in pneumonia. *Pediatrics* 132: 237–244.
2. Brogan TV, Hall M, Williams DJ, Neuman MI, Grijalva CG, et al. (2012) Variability in processes of care and outcomes among children hospitalized with community-acquired pneumonia. *Pediatr Infect Dis J* 31: 1036–1041.
3. Bradley JS, Byington CL, Shah SS, et al. The management of community-acquired pneumonia in infants and children older than 3 months of age: clinical practice guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America. *Clin Infect Dis*. 2011;53(7):e25-76.
4. Heine D et al. (2013). The prevalence of bacteremia in pediatric patients with community-acquired pneumonia: guidelines to reduce the frequency of obtaining blood cultures. *Hosp Pediatr* 3: 92–96.
5. Abe T, Tokuda Y, Ishimatsu S, Birrer RB. Usefulness of initial blood cultures in patients admitted with pneumonia from an emergency department in Japan. *J Infect Chemother*. 2009;15(3):180–186.
6. Benenson RS, Kepner AM, Pyle DN II, Cavanaugh S. Selective use of blood cultures in emergency department pneumonia patients. *J Emerg Med*. 2007;33(1):1–8.
7. Campbell SG et al. Utility of blood cultures in the management of adults with community acquired pneumonia discharged from the emergency department. *Emerg Med J*. 2003;20(6):521–523.
8. Myers AL, Hall M, Williams DJ, Auger K, Tieder JS, et al. (2013) Prevalence of bacteremia in hospitalized pediatric patients with community-acquired pneumonia. *Pediatr Infect Dis J* 32: 736–740.
9. Leonard P, Beattie TF. How do blood cultures sent from a paediatric accident and emergency department influence subsequent clinical management? *Emerg Med J*. 2003;20(4):347–348.
10. Arbo MD, Snyderman DR. Influence of blood culture results on antibiotic choice in the treatment of bacteremia. *Arch Intern Med*. 1994;154(23):2641–2645.
11. Requejo HI, Guerra ML, Dos Santos M, Coccoza AM. Immunodiagnoses of community-acquired pneumonia in childhood. *J Trop Pediatr*. 1997;43(4):208–212.
12. Tajima T, Nakayama E, Kondo Y, et al. Etiology and clinical study of community-acquired pneumonia in 157 hospitalized children. *J Infect Chemother*. 2006;12(6):372–79.
13. Leibovitz E, Tabachnik E, Fliedel O, et al. Once-daily intramuscular ceftriaxone in the outpatient treatment of severe community acquired pneumonia in children. *Clin Pediatr (Phila)*. 1990;29(11):634–639.
14. Neuman MI, Shah SS, Shapiro DJ, Hersh AL (2013) Emergency department management of childhood pneumonia in the United States prior to publication of national guidelines. *Acad Emerg Med* 20: 240–246.
15. Niederman MS, Bass JB Jr, Campbell GD, et al; American Thoracic Society. Medical Section of the American Lung Association. Guidelines for the initial management of adults with community-acquired pneumonia: diagnosis, assessment of severity, and initial antimicrobial therapy. *Am Rev Respir Dis*. 1993;148(5):1418–1426.
16. Laundry M, Ajayi-Obe E, Hawrami K, Aitken C, Breuer J, Booy R. Influenza A community acquired pneumonia in East London infants and young children. *Pediatr Infect Dis J*. 2003;22(suppl 10):S223–S227.
17. Lakhani D, Muley P. The association of positive chest radiograph and laboratory parameters with community acquired pneumonia in children. *J Clin Diagn Res*. 2013;7(8):1629–1631.
18. Kurz H, Göpfrich H, Huber K, et al. Spectrum of pathogens of in-patient children and youths with community acquired pneumonia: a 3 year survey of a community hospital in Vienna, Austria. *Wien Klin Wochenschr*. 2013;125(21-22):674–679.

Copyright: © the author(s) and publisher IJMRP. This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite the article: C Ratna Kishore. A Clinical Study of Evaluation of Blood Cultures in Paediatric Patients of Community Acquired Pneumonia. *Int J Med Res Prof*. 2015; 1(3); 187-89.