VOLUME - 12, ISSUE - 02, FEBRUARY - 2023 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Paediatric Medicine

BACTERIOLOGICAL PROFILE IN COMMUNITY ACQUIRED PNEUMONIA IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Introduction: Community acquired pneumonia (CAP) refers to clinical signs and symptoms of pneumonia acquired outside a hospital setting [1]. **Methods and Material:** It was a prospective study conducted at department of Paediatrics, Prathima Institute of Medical Sciences, Karimnagar. for a period of 1 year on children with community acquired pneumonia admitted in ward and PICU. Total 60 cases were enrolled in the study according to recent WHO guidelines of community acquired pneumonia. Oropharyngeal swab and blood culture samples were collected from every child and sent for culture and sensitivity. **Results:** Out of 60 cases, 43 (71.6%) were diagnosed as pneumonia and 17 (28.4%) were as severe pneumonia. On blood culture only 11 (18.3%) had positive growth and on oropharyngeal swab culture 14(23.33%) had growth. Microorganisms isolated in blood culture were predominantly Staphylococcus aureus, while in throat swab culture Streptococcus predominated. **Conclusion:** The overall rate of isolation of organism in CAP is low. The yield of culture positivity was 23% in throat swabs, with Streptococcus pneumonia being most common isolate, whereas 18% in blood culture with Staphylococcus aureus being predominantly isolated organism.

KEYWORDS : CAP, Blood culture, Oropharyngeal swab culture.

INTRODUCTION

Acute respiratory tract infections are the largest cause of morbidity and mortality among under-five children worldwide [2-6]. Pneumonia are the number one cause of under-5 child mortality, responsible for nearly 400000 deaths in India annually[7]. In paediatric age group, the developing immune system and age related exposures result in infection caused by varied yet consistent set of bacterial and viral pathogens, which are different in different countries and changing with season within the same country. Recent systematic reviews of childhood pneumonia etiology suggest that in developing countries, a few bacteria (S. pneumoniae and H. influenzae) and viruses (respiratory syncytial virus, influenza virus) are associated with majority of childhood CAP[7].

In India, there are only a few systematic review or studies regarding the etiology of pneumonia in children. [2,5] In general, the etiology can be identified in only 30%–50% of cases using conventional methods. [6] This lack of information leads to inappropriate use of antibiotics with consequent antibiotic resistance and increased cost. [6]

Ascertaining the etiology in childhood CAP is important because it plays a important role in shaping the individual treatment decisions, antibiotic policy in the community, and also rationalize immunization policy at a national level. Our study is aimed at recognising the common etiological agents and sensitivity pattern of organisms in children suffering from CAP and admitted in our centre.

METHODS

Study setting-

This study was a hospital based prospective study and was conducted in the department of Paediatrics, Prathima Institute of Medical Sciences, Karimnagar, after the ethical committee clearance.

Study design-

The study design was prospective and observational study.

Study period-

This study was conducted from August 2021 to September 2022.

Sample size- The sample size of study was 60.

Inclusion criteria-

Children aged 2 months to 12 years who presented with history of fever, cough and difficulty in breathing fulfilling WHO case definition of CAP were enrolled. According to WHO [8] pneumonia and severe pneumonia are defined as follows.

Pneumonia:

Patient present with cough, cold, fever, rapid breathing and chest indrawing and tachypnoea is defined as respiratory rate >60/minute for infant <2 months, >50/minute for infants 2-12 months, >40/minute for children >12-60 months, >30/minute for children >60-144 months [8].

Severe pneumonia:

Patient present with sign and symptoms of pneumonia and associated with danger signs, like inability to drink, persistent vomiting, convulsion, lethargic or unconsciousness, stridor in calm child with severe malnutrition.

Exclusion criteria-

Children with duration of illness >7 days, those who had received antibiotics for >24 hours at presentation or those with previous hospitalization for > 48 hours in last 2 weeks, children with wheeze who had received a single dose of bronchodilator (salbutamol @0.15mg/kg by nebulization) and symptoms disappeared were excluded.

Sampling Method-

Detailed history and clinical examination done, sample for throat swab and blood for culture and sensitivity were collected with standard precautions from every child and sent for bacteriological lab within 30 minutes of collection.

Statistical Analysis-

The data was collected and compiled systematically in a tabular form and then analysed statistically.

RESULTS

Total of 60 patients were enrolled in our study based on inclusion criteria. Most of the children i.e. 43 (71.6%) were diagnosed as pneumonia and rest 17 (28.4%) were classified as severe pneumonia. Based on the age group, out of 60, 38(63.33%) children belonged to 2-12 months, 13(21.6%) children belonged to age group of 13-24 months, and remaining 9(15%) belonged to >2years. Based on gender,

38(63.33%) were male and 22 (33.66%) were female, ratio being 1.7:1. Most of them belonged to low SES 32 (53.33%), followed by lower middle class 14 (23.33%). It was observed that majority 33(55%) were having no infiltrates on chest xray. Current study revealed positive blood culture was seen only in 11(18.3%), while rest were negative. Children with severe pneumonia had 8 (47.05%) culture positives when compared to children with pneumonia who had only 3 (6.9%) positive culture growth. On applying chi square test we found significant result (P value= 0.0003) which revealed growth on blood culture depends on severity of illness. Bacteriologically, blood culture showed predominant growth of Staphylococcus aureus 6(10%), followed by Streptococcus pneumonia 2(3.33%). On throat swab culture, 14 cases yielded growth, in which 5 had pneumonia and 9 had severe pneumonia, amongst which Streptococcus pneumonia predominated 6(42.8%) followed by Staphylococcus aureus 4(28%), followed by Klebsiella 2(14.2%) and E Coli 2(14.2%) which were equal.

Table-1: Result of blood culture

Blood C & S	Pneumonia	Severe pneumonia	Total	%
Growth positive	3	8	11	18.3%
Growth negative	40	9	49	81.7%
Total	43	17	60	-

Table-2: Result of oropharyngeal swab culture

Oropharyngeal swab culture	Pneumonia	Severe Pneumonia	Total	%
Growth Positive	5	9	14	23.33%
Growth negative	38	8	46	76.66%
Total	43	17	60	-

Table- 3: Bacterial culture in clinical specimen

Organisms	Blood culture {n=60}	Oropharyngeal swab culture {n=60}
Staphylococcus aureus	6(10%)	4(28%)
Streptococcus pneumonia	2(3.33%)	6(42.8%)
E.coli	-	2(14.2%)
Klebsiella species	1(1.6%)	2(14.2%)
Pseudomonas aeruginosa	1(1.6%)	-
Hemophilus influenzae	1(1.6%)	-

DISCUSSION

There is a constant threat of emerging antibiotic resistance due to liberal travel across geographical borders, in-advert, irrational antibiotic use. Owning to limitation of data regarding antibiotic sensitivity and resistance pattern, this study was undertaken to create a baseline antibiotic resistance database for formulating an effective infection control policy in our centre.

60 children who came with fever, cough, cold, rapid breathing and refusal to feed were included after excluding the exclusion criteria. In present study, 43 (71.6%) subjects were diagnosed as pneumonia and 17 (28.4%) diagnosed as severe pneumonia. Similar results were found in other studies done by different author [5,9,10,11,12].

Males were affected more commonly than females (63.33% Vs 36.66%) with ratio 1.7:1 in our study, which is similar to the study done by Aditi et al[13] where Males predominated females i.e. 64.6% vs 35.4%, similar observations were made in other studies[10,11,12].

Where as a study from Bulgaria done by Guergana Pertroval et al[14] had almost equal male and female population enrolled in the study (48% vs 52%), which implies female neglect and gender biased attitude of our society.

In our study, majority of patients i.e. 76% were belonged to age group 2-12 months followed by 13-24 months(10%). In a study done in 2015 [13] majority of patients 78.2% belonged to age group 2-12 months followed by 21.7% belonged to 12-59 months age group.

Similar results were obtained in other studies [10,11,12,15]. This may be due to lack of exclusive breastfeeding for first 6 months, lack of immunization, vitamin A deficiency which aggravates the already deficit immune condition in infants.

Majority of subjects i.e. 28 (56%) belonged to lower socioeconomic status, which is again similar to others study [12,16,17,18]. This could be attributed to overcrowding, poor parental education, indoor air pollution in deprived community.

The comparison of blood culture and oropharyngeal swab culture of various studies are given in table no. 4

Table-4: Comparison of organisms isolated in various study and their sensitivity pattern

Sr. No.	Author	Sample/Test	Result
1	Patwari et al (1996)[19]	Throat swab, NPA,lung aspirate and blood	1.In infants <3months - Escherichia coli[50%], Klebsiella [25%]and S.pneumoniae[18%]. 2.Between 7 and 24 months - H.Influenza[31%] 3.In all age groups-S.pnemonia and S.aureus: common
2	Pandey et al (2000) [20]	blood	1.S.pneumoniae isolated in 12.8% of all ALRTI 2.S. aureus isolated in 7.1% of all ALRTI
2	The SENTRY antimicrobial surveillance study (2000)[21]	Blood culture	Organism recovered were Staph. aureus (28%) Pseudomonas aeruginosa (10%) Strep. pneumoniae (9.1%)Klebsiella (7.5%) H. influenzae (7.3%)
4	Kanungo and rajalakshmi (2001)[22]	blood	1. 7.3% of isolated S.pneumoniae were resistant to penicillin.
5	Awasthi et al. (2004; ISCAP)[23]	NPA and nasopharyngeal swab	1. 66.3% of isolated S.pneumoniae were resistant to cotrimoxazole, 4.1% to chloramphenicol, 15.9% to oxacillin and 2.9% to erythromycin
6	Capoor et al. (2006)[24]	Blood culture	1. blood culture positivity: 27.4% (by combine method of Bac T and conventional methods) 2. S.pneomoniae (35.3%), staphylococcus aureus (23.5%), klebsiella pneumoniae(20.5%) and haemophilus influenzae (8.8%)
7	Neuman MIet al 2007-11 [25]	Blood culture	Strep. pneumoniae accounted for 78% of all detected pathogen 82% susceptible for penicillin
8	Tiewsoh et al. (2009)[26]	Blood culture	1. blood culture positivity : 15% 2.the most common organism S.pneumoniae (40%)

9	Joseph et al 2011-13 [9]	Blood culture, PCR, BAL	NPA & blood culture Yielded bacteria in only 322 (13.7%) and 49(2.1%) children respectively in NPA, Strep. pneumoniae predominated, followed by H. influenzae (9.6%) and Staph. aureus (6.8%). In blood S. aureus (30.6) dominated followed by S. pneumoniae (20.4%) and Klebsiella, pneumoniae (12.2%) M. pneumoniae and C. pneumoniae serology were positive in 4.3% and 1.1% respectively
10	Anusmita das et al 2013-14 [10]	Blood culture	Blood culture was positive in 3% cases while oropharyngeal positive in 16.8% S. pneumoniae was major isolate
11	Yudhavir et al (2016)[11]	Blood culture	On blood culture S. aureus (10%) predominated followed by S. pneumoniae (3.1%) On NPA Strep. pneumoniae was predominated 18.5%
12	Chaudhary et al(2016-2017)[12]	Blood culture, oropharyngeal culture	On blood culture- staph. aureus was the most common organism isolated(8%) oropharyngeal culture- strep. pneumoniae was most common bacteria(10%)

In our study (2019-2020), oropharyngeal culture isolated predominately Streptococcus pneumonia, whereas in blood culture the most common organism isolated was Staphylococcus aureus which is similar to the studies done above.

Out of 60 patients, 49 (81.67%) recovered and discharged uneventfully and 3(5%) children died, remaining 8 (13.33%) patients in our study either absconded or were discharged against medical advice. Out of the 3 mortality, all 3 were from severe pneumonia group which can be concluded that mortality is more common in severe pneumonia age group.

Our finding is similar to the study conducted by Anusmita das et al (2016) who also reported similar mortality rate (i.e. 8.8%) [10].

CONCLUSION

Thus following conclusions were made from our study- Incidence of CAP is highest during infancy and decreases with advancing age. Also the increased prevalence seen in Lower socioeconomic strata highlights the importance in addressing the preventable risk factors such as malnutrition, illiteracy, overcrowding, poor attitude towards vaccination, indoor air pollution. Vaccine coverage against Streptococcal pneumoniae and H.influenza needs to improve to reduce the mortality and morbidity. Identifying and changing barriers to accessing health care is important.

The results achieved in our study may help in formulation of better antibiotic policy against community acquired pneumoniae in children less than 12 years in our region. There is a need of advanced diagnostic methods which improve the diagnostic yield by detection of fastidious and atypical organisms.

Limitation of the study- Hemophilus Influenzae could not be isolated in any of the cases as throat swabs were done by conventional method. Isolation of these organisms require PCR and DNA studies.

What this study adds to existing Knowledge: Blood culture and throat swab culture can help in diagnosis and management of resistant cases. But most of the results comes negative so clinical diagnosis and treatment is still useful in community acquired pneumonia.

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