

Original Research Article

Study on clinical profile and risk factors associated with pneumonia

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ABSTRACT

Background: Modernization, industrialization and urbanization are now posed with the problem of increase in ARI morbidity and mortality. The epidemiological information regarding risk factors and management is scanty. A large gap exists in our knowledge about these factors, which needs to be fulfilled by systematic studies. The present study is designed to identify the risk factors of pneumonia in our area.

Methods: This was a prospective clinical study of pneumonia conducted on 94 children who were admitted to Paediatric ward in GSL Medical College General Hospital, Rajahmundry in study duration. Epidemiological factors affecting the same were studied and bronchoscopy was done whenever it was needed. A detailed history of the relevant symptoms, such as fever, cough, rapid breathing, refusal of feeds, noisy breathing, bluish discoloration etc., was collected.

Results: The most affected children belonged to the age group of 1 year to 3 years (64.9%). Bronchopneumonia (86.2%) was the most common clinical diagnosis made at admission. According to WHO ARI control programme, 28.7% had pneumonia, 54.3% had severe pneumonia and 17% very severe pneumonia. It was found that younger age group, malnutrition, kutcha house, crowding, poor sanitation facilities, cooking with fuel other than LPG (indoor pollution) and low socio economic status and high respiratory rate were significant risk factors for pneumonia in children.

Conclusions: ARI, especially pneumonia is one of the major causes of morbidity and mortality in children. Bronchopneumonia is the predominant form of presentation in infants and preschool children.

Keywords: Children, Malnutrition Pneumonia, Morbidity, Mortality, Risk factors

INTRODUCTION

Acute respiratory infections (ARI), particularly lower respiratory tract infections (LRTI), are the leading cause of death among children under five years of age and are estimated to be responsible for between 1.9 million and 2.2 million childhood deaths globally.¹

Modernization, industrialization and urbanization are now posed with the problem of increase in ARI morbidity and mortality. It is clear that future health of children depends on preventing, diagnosing, treating and limiting ALRTI. The utility of simple clinical signs like rapid

breathing and chest in drawing to diagnose pneumonia in infants and young children has been well established. The use of these clinical signs in the early detection and treatment of children with pneumonia by primary health care workers forms the basis for the case management strategy formulated by the World health organization (WHO) to control mortality and morbidity.²

ARI can be preventable. However, socio environmental factors are acting as major obstacles in prevention of ARI. The epidemiological information regarding risk factors and management is scanty. A large gap exists in this knowledge about these factors, which needs to be

fulfilled by systematic studies. The present study is designed to identify the risk factors of pneumonia in this area. Objective of this study is to assess the clinical profile and identification of risk factors of pneumonia

METHODS

The present prospective clinical study of pneumonia was conducted on 94 children who were admitted to Paediatric ward in GSL Medical College General Hospital, Rajahmundry from 2015 to 2017. Epidemiological factors affecting the same were studied and bronchoscopy was done whenever it was needed.

Inclusion criteria

Children in the age group of one year to five years with clinical features of pneumonia as per WHO ARI control programme were included.

Exclusion criteria

Children with congenital anomalies of heart and lungs, anatomical defects like 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.

Data collection procedure

A detailed history of the relevant symptoms, such as fever, cough, rapid breathing, refusal of feeds, noisy breathing, bluish discoloration etc., was collected.

Based on WHO ARI criteria, children were considered to have tachypnea if respiratory rate (RR):

- RR >60 in <2 months
- RR >50 in 2 months-1 yr.
- RR >40 in 1 yr-5 yrs.

A detailed examination of each child including anthropometry was carried out. During the general physical examination, emphasis was laid on assessing general condition of the child, respiratory rate, presence of fever and other signs such as cyanosis and pallor. Detailed systemic examination of the respiratory, cardiovascular and central nervous systems was done. Any associated illnesses such as septicemia, meningitis, diarrhoea and congestive cardiac failure if present were noted. Socio economic history regarding the type of house, family size, sanitary facilities and fuel based for cooking were recorded. Socio economic status was classified according to modified Kuppaswamy classification. Other pertinent information such as immunization status (Immunized, partially immunized or unimmunized), feeding practices and degree of malnutrition (IAP classification) were also recorded.

According to WHO ARI criteria, children were classified into 3 groups: pneumonia, severe pneumonia and very severe pneumonia. For analytic purpose, risk factors for pneumonia were studied.

Following Investigations were carried out

- Blood Investigations - Hb%, TC, DC, ESR were done in all cases.
- Chest X-ray was taken in all patients.
- Blood culture was done in all cases.

All patients received antibiotics. Supportive care (IV fluids, oxygen, nebulization etc) was given as and when required. Antibiotics that were used:

1. First line antibiotics: Amoxicillin.
2. Second line antibiotics: Amoxicillin and Clavulanic acid.
3. Others: Ceftriaxone, Vancomycin

Those children who failed to respond to 1st line antibiotics within 48hrs, received second line antibiotics. Ceftriaxone and/ Vancomycin was considered in case of empyema/massive consolidation. Closed tube drainage was considered in cases of empyema. All children were evaluated during the hospital stay and the response to treatment was noted.

Statistical analysis

Continuous data was represented as mean±standard deviation. Categorical data was expressed as numbers in percentage. Chi square test was used to determine significant differences between three groups. Significance for the statistical tests was pre-determined at a probability value of 0.05 or less ($p < 0.05$).

RESULTS

In the present study, majority of cases (64.9%) were less than three years of age. Majority of cases (61.7%) were females.

In this study, fast breathing (100%), cough (100%), fever (100%) were the most common symptoms. Refusal of feeds was present in 17% of cases.

In this study, chest retractions were present in 71.27% cases, both crepitations and ronchi were present in 75.5% cases, crepitations alone were heard in 14.9% cases, ronchi alone in 9.6% cases and abnormal breath sounds (bronchial breathing/ diminished breath sounds) in 28.7% of cases.

In the present study, tachypnoea was present in all cases (100%), 70.2% had respiratory rate of >60 cycles per min. Mean duration of tachypnoea was 1.5 ± 0.61 days during hospital stay (Table 1).

Table 1: Basic characteristics.

Characteristics	Frequency	Percentage
Age		
1-3	61	64.9
4-5	33	35.1
Sex		
Male	36	38.3
Female	58	61.7
Symptoms		
Cough	94	100%
Fever	94	100%
Fast breathing	94	100%
Fefusal of feeds	16	17%
Convulsions	2	2.1%
Cyanosis	3	3.2%
Signs		
Chest retractions	67	71.27%
Crepitations	14	14.9%
Ronchi	9	9.6%
Crepitations and ronchi	71	75.5%
Abnormal breath sounds	27	28.7%
Respiratory rate		
41-50	5	5.31%
51-60	23	24.46%
60 and ABOVE	66	70.21%

In this study pneumonia was associated with diarrhoea in 1.1% cases, septicemia in 1.1% cases, meningitis in 2.2% cases, DIC in 1.1% cases. According to WHO ARI programme, 28.7% had pneumonia, 54.3% had severe pneumonia and 17% had very severe pneumonia.

Majority of the cases were clinically diagnosed as Bronchopneumonia (86.2%), Lobar pneumonia (consolidation) was diagnosed in 11.7% of cases and pneumonia and its complications (Empyema) in 2.1% cases. Closed tube drainage was considered in empyema cases (Table 2).

Table 2: Distribution of cases according to clinical findings.

Associated illness	Frequency	Percentage
Diarrhoea	1	1.1%
Meningitis	2	2.2%
Septicemia	1	1.1%
DIC	1	1.1%
Classification		
Pneumonia	27	28.7%
Severe pneumonia	51	54.3%
Very severe pneumonia	16	17%
Clinical diagnosis		
Bronchopneumonia	81	86.2%
Lobar pneumonia	11	11.7%
Empyema	2	2.1%

In the present study, majority were breast-fed (78.7%) and remaining 21.3% were bottle fed. Majority (78.7%) were under Grade I (40.4%) and Grade II (38.3%) PEM. 6.4% were under Grade III. In the present study, majority, 53 cases (56.4%) lived in ill-ventilated thatched house (kutchha) and out of them 35 houses [66.03%] were crowded. In the present study, majority (59.6%) had poor sanitary facility (open air defecation) and majority (57.4%) used fuel other than LPG for cooking (Table 3).

Table 3: Distribution of risk factors.

Factors	Frequency	Percentage
Type of feeding		
Breast fed	74	78.7%
Bottle fed	20	21.3%
Protein energy malnutrition		
Normal	14	14.9%
Grade – I	38	40.4%
Grade – II	36	38.3%
Grade – III	6	6.4%
Grade – IV	0	0
Type of house		
PUCCA	41	43.6
KUCHA	53	56.4
Sanitation facilities		
Good	38	40.4
Poor	56	59.6
Cooking		
LPG	39	41.5
NON-LPG	55	57.4

In this study, risk factors for pneumonia were studied. It was found that younger age group, malnutrition, anemia, kutchha house, crowding, poor sanitary facilities, cooking with fuel other than LPG (indoor pollution) and low socio economic status were significant risk factors for pneumonia in children (Table 4).

Table 4: Association of Risk factors with pneumonia.

Factors	p-value	Significance
Age	0.03	S
Sex	0.4	NS
Past History	0.02	S
Anemia	0.009	S
Type of House	<0.0001	HS
PEM	<0.0001	HS
Fuel for cooking	<0.0001	HS
Sanitation	<0.0001	HS
Crowding	0.012	S

Mortality

In the present study, case fatality rate was 1.06% (1 case). Death occurred within 24 hours of presentation to hospital. Septicemia with shock, meningitis, DIC were

seen in this case and this case belonged to very severe pneumonia.

DISCUSSION

Age distribution

Age is an important predictor of morbidity and mortality in pediatric pneumonias. In the present study, conducted between the age group of one year to five years, majority (64.9%) were less than three years of age. This was in comparison with studies done by Drummond P et al, (63.2%) and Sehgal V et al, (52.2%).^{3,4}

Sex Distribution

In this study it was observed that females (61.7%) outweighed males (38.3%). Female: Male ratio was 1.61. This was in comparison with studies done by Hamid M et al, (68.25) and Rahman et al, (59.2%).^{5,6}

Symptomatology

The WHO protocol puts forward two signs as the “entry criteria” or basis for examining a child below five years of age for possible pneumonia: cough or difficult breathing.

The incidences of presenting symptoms in this study are comparable with studies conducted by Kabra SK et al, and Kumar N et al.^{7,8}

Signs

Tachypnoea has been improved to be a sensitive and specific indicator of the presence of 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, tachypnoea (100%) and chest retractions (73%) were the important signs for making a clinical diagnosis of pneumonia. Crepitations and ronchi (78%) and abnormal breath sounds (29%) were the other associated signs.

Gupta D et al, Margolis P et al, Palafox M et al, and Gadomski AM et al, have observed that tachypnoea and chest retractions were highly specific signs in detecting pneumonia. Reddaiah VP et al, have reported that crepitations and ronchi were found in 76% of patients with pneumonia.⁹⁻¹³

Associated illness

In this study, pneumonia was associated with diarrhea in 1.1% (1 case) and septicemia with shock in 1.1% (1 case). This was in comparison with studies done by Deivanayagam N et al, and Sehgal V et al.^{4,14}

Clinical Diagnosis

In this study Bronchopneumonia was the most common diagnosis made at admission (86.2%), Lobar pneumonia (consolidation) in 12.7%, pneumonia with complications in 2.1% (empyema). In a study conducted by Reddaiah V. P et al, Bronchopneumonia was diagnosed in 64%, Lobar pneumonia in 6.4% and post measles bronchopneumonia in 4.0% of cases.¹³

Risk factor among children pneumonia

In the present study risk factors among children with pneumonia were studied. It was found that, presence of anemia, malnutrition, poor housing conditions, low socio economic status, poor sanitary facilities and indoor environmental pollution (use of cooking fuel other than LPG) were significant risk factors for pneumonia.

Broor S et al, have reported that lack of breast feeding, severe malnutrition, cooking fuel other than LPG and history of ALRTI in family were significant contributors of severe ALRTI in children under 5 years.¹⁵

In a case control study conducted by Hassan MK et al, it was found that age less than 6 months, smoking at home, anemia, lack breast feeding and malnutrition were significant risk factors for severe pneumonia.¹⁶

Shah N et al, also have found that young age, immunizations, malnutrition, previous history of severe ARI emerged as significant risk factors for severe pneumonia.¹⁷

Mortality

In this study, case fatality rate was 1.06% (1 case). Death occurred within 24 hrs. of presentation to hospital. This is in comparison with studies conducted by Sehgal V et al, Suwanjutha S et al, Reddaiah VP et al, and Mishra S et al, who have reported a case fatality rate of 10.45%, 3.4%, 12.8% and 7.7% respectively.^{4,13,18,19}

Underlying congenital heart disease (CHD) is a significant risk factor for pneumonia mortality. As we had excluded pneumonia associated with CHD, this may be the probable reason for low case fatality rate seen in this study.

Risk factors for mortality

In the present study it was found that severity of pneumonia (very severe) malnutrition and associated illnesses (septicemia, meningitis) were significantly associated with mortality. Sehgal V et al in their study have reported that younger age group, associated congenital heart disease; very severe pneumonia and malnutrition were significant predictors of mortality.⁴ Deivanayagam N et al, in their study have reported that younger age group malnutrition, congenital anomalies

and associated illness were significant risk factors for pneumonia.¹⁴

CONCLUSION

ARI, especially pneumonia is one of the major causes of morbidity and mortality in children. Bronchopneumonia is the predominant form of presentation in infants and preschool children. Among the risk factors studied, younger age group, malnutrition, poor housing conditions and indoor air pollution (use of cooking fuel other than LPG), low socio economic status and poor sanitary facilities were found significant for pneumonia.

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