



## PREDICTORS OF MORTALITY IN CHILDREN WITH PNEUMONIA IN A SEMI-URBAN TERTIARY CARE HOSPITAL IN SOUTH INDIA

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Pneumonia, WHO criteria, Risk Factors, Mortality.

### ABSTRACT

**Objective:** To identify the risk factors for mortality associated with pneumonia

**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 indrawing in Rajah Muthiah Medical College, Chidambaram were included in the study. Detailed history, physical examination were recorded in a proforma. Investigations included CBC, Chest X ray. Significant predictors of mortality were determined by comparing not survived with survived subjects in statistical analysis (p value < 0.05).

**Results:** Respiratory distress (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. The case fatality rate was 6%. Majority of deaths occurred within 24 hours of presentation to hospital. Significant predictors of mortality were associated illness (meningitis, CCF), PEM (Grades 3&4), bottle feeding.

**Conclusion:** ARI, especially pneumonia is one of the major causes of morbidity and mortality in children. Symptoms and signs like cough, fever, tachypnea, chest indrawing, crepitations mentioned in the WHO ARI control programme were very sensitive and can be applied to hospitalized children. Bottle feeding, PEM grade 3 and 4, and associated illness (meningitis, CCF) were the important risk factors for mortality.

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### INTRODUCTION

Pneumonia kills more number of children than any other disease (more than AIDS, malaria and measles combined). More than 1.1 million under 5 years of age children around the world die from pneumonia each year, accounting for almost 17% of under five deaths worldwide. Yet, very little attention is paid to this dreadful disease. It is estimated that 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. The epidemiological information regarding risk factors for mortality 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 clinically study children with pneumonia and to identify the risk factors for mortality associated with it.

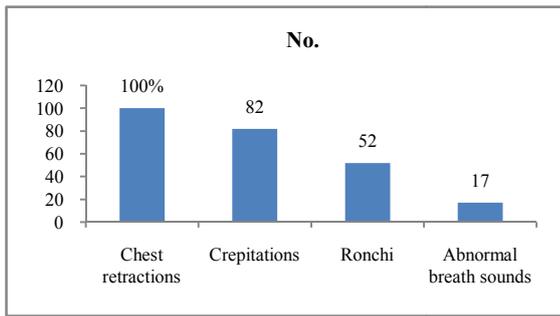
### MATERIALS AND METHODS

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 indrawing 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. Any associated illness such as diarrhoea, meningitis and congestive cardiac failure if present was noted. Socio economic history, immunization status, feeding practices and degree of malnutrition (IAP classification) were also recorded. Investigations included

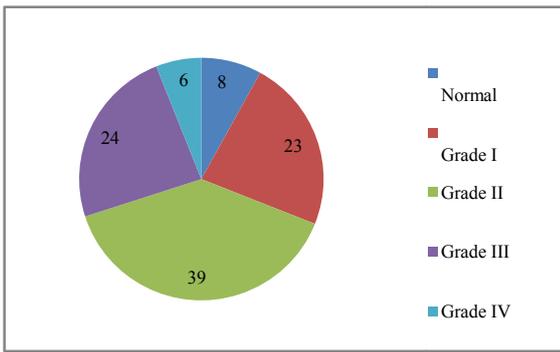
chest X-ray, CBC. Risk factors of mortality were considered significant if p value <0.05.

**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. Diarrhea (7%), meningitis (3%) and CCF (1%) were the associated illness. In this study, 74% were immunized to date and 4% did not receive any vaccine.71% were breast-fed and 29% were given bottle feeds. 55% were anemic. 62% had grade 1 and 2 PEM and 30% had grade 3 and 4 PEM



**Graph 1 Clinical Signs**



**Graph 2 PEM**

Majority(88%) were from poor socioeconomic status(grade 3,4and 5 modified kuppusamy classification). 88% lived in ill ventilated, thatched house(kutchha) and 56% Of houses were crowded. 90% did not have good sanitary facilities and 64% used fuel other than LPG for cooking. A previous history of similar illness was present in 10% of cases a family history of acute lower respiratory tract infection was present in 6% of cases. Case fatality rate was 6%. Majority of deaths occurred within 24 hours of presentation to hospital. Among the risk factors studied, bottle feeding, PEM grade 3 and 4, and associated illness were significantly associated with mortality.

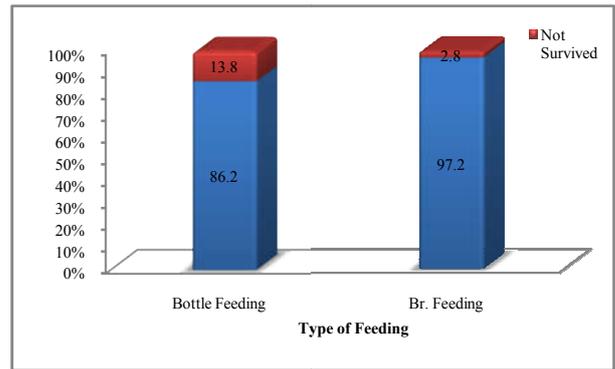
**Table 1 Associated Illness**

Associated illness	Survived				Total
	Survived		Not Survived		
	N	%	N	%	
Yes	8	72.7	3	27.3	11
No	86	96.6	3	3.4	89
Total	94	94.0	6	6.0	100

Associated illness: p value : 0.002 (Significant).

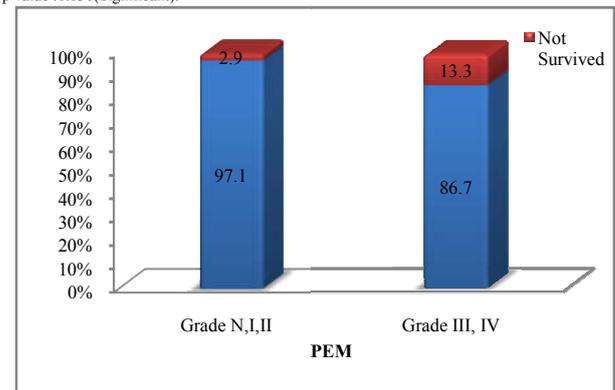
**Table 2 Risk Factors for Mortality**

Factor		Survived	Not survived	P	Significance
Age	<1 yr	40	4	0.249	N S
	>1 yr	54	2		
Sex	Male	43	3	0.839	N S
	Female	51	3		
Associated Illness	Yes	8	3	0.002	S
	No	86	3		
Past history	Yes	10	0	0.4	N S
	No	84	6		
Family history of ARI	Yes	6	0	0.117	N S
	No	88	6		
Immunization	Complete	70	3	0.191	N S
	Incomplete	24	3		
Anemia	Yes	53	2	0.271	N S
	No	41	4		
Feeding	Breast fed	69	2	0.036	S
	Bottle fed	25	4		
Malnutrition	Grade N,I,II	68	2	0.043	S
	Grade III,IV	26	4		
Type of house	Pucca	11	1	0.717	N S
	Kutchha	83	5		
Fuel for cooking	LPG	33	3	0.461	N S
	Non LPG	61	3		
Sanitation	Poor	84	6	0.4	N S
	Good	10	0		
SES	Grade I,II,III	30	2	0.942	N S
	Grade IV,V	64	4		



**Graph 3 Type of Feeding**

p value :0.036(Significant).



**Graph 4 Pem Grades 3 & 4**

p value: 0.043(Significant)

**DISCUSSION**

Pneumonia continues to pose a threat to health of children in developed and developing countries despite improvements in socioeconomic status, immunization and early diagnosis and treatment. Universality, vulnerability and frequency of

occurrence of acute LRTI in children are well recognized all over the world

**Age:** Age is an important predictor of morbidity and mortality in pediatric pneumonia. In the present study, conducted between the age group of one month to twelve years, majority (82%) were less than 5 years. This was in comparison with CDC EPIC study (70%).

**Sex Distribution:** In our study it was observed that male (54%) outweighed females (46%). Male: female ratio was 1.17:1. This was in comparison with studies done by Sehgal V et al (58.25) and Drummond P *et al.* (58%).

**Symptomatology:** The incidence of presenting symptoms in our study, cough-100%, fever-99%, rapid breathing-100%, refusal of feeds-24% are comparable with study conducted by Kumar N *et al* (fever-88%, cough-100%, rapid breathing-100%, refusal of feeds-22%).

**Signs:** In our study, tachypnoea (100%) and chest retractions (100%) were the important signs for making a clinical diagnosis of pneumonia. Crepitations (82%), ronchi (52%) and abnormal breath sounds (17%) were the other associated signs. Gupta D *et al*, Margolis P *et al*, Palafox M *et al* have observed that tachypnoea and chest retractions were highly specific signs in detecting pneumonia. Reddaiah VP *et al*, have reported that crepitations were found in 76% and ronchi in 23.2% of patients with pneumonia.

**Mortality:** In our study, case fatality rate was 6%. 66.67% (4 cases) of deaths occurred within 24 hrs of presentation to hospital. This is in comparison with studies conducted by Sehgal V *et al*, Reddaiah VP *et al* who have reported a case fatality rate of 10.45%, 12.8% respectively. 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 our study.

**Risk factors for mortality:** It was found that bottle feeding, malnutrition grade 3 and 4 and associated illness (septicemia, meningitis) were significantly associated with mortality. (p value < 0.05). Lamberti *et al* in their meta analysis titled Breastfeeding for reducing the risk of pneumonia morbidity and mortality in children under two, found that pneumonia mortality was higher among not breastfed compared to exclusively breastfed in children up to 2 years of age. Padmanabhan Ramachandran *et al* in their study concluded need for assisted ventilation was found to be independently associated with mortality. Young age (1-6 months), malnutrition (<-2Z weight for age), altered level of consciousness and associated congenital heart disease are other factors. Sehgal V *et al* in their study have reported that age less than 1 year, associated congenital heart disease; very severe pneumonia and malnutrition were significant predictors of mortality. Deivanayagam N *et al* in their study have reported that age less than 6 months; malnutrition, congenital anomalies and associated illness were significant risk factors for pneumonia.

## CONCLUSION

ARI, especially pneumonia is one of the major causes of morbidity and mortality in children. Symptoms and signs like cough, fever, tachypnoea, chest indrawing, crepitations mentioned in the WHO ARI control programme were very sensitive and can be applied to hospitalized children. Bottle

feeding, PEM grade 3 and 4, and associated illness (meningitis, CCF) were the important risk factors for mortality.

## References

1. UNICEF, WHO (2006), Pneumonia the forgotten killer of children
2. Park K. Acute respiratory infections. In: Park's text book of preventive and social medicine, 23<sup>rd</sup> ed. Jabalapur: M/s Banarasidas Bhanot publishers; 2015. p.167-74.
3. Singh V, Aneja S. Pneumonia – management in the developing World. *Pediatr Respir Rev* 2011;12:52-59.
4. Jain S, Williams DJ, Arnold SR, Ampofo K, Bramley AM *et al* for the CDC EPIC study team. Community-Acquired Pneumonia Requiring Hospitalization among U.S. Children *N Engl J Med* 2015; 372:835-45.
5. Sehgal V, Sethi GR, Sachdev HPS, Satyanarayana V. Predictors of mortality on subjects hospitalized with acute lower respiratory tract infections. *Indian Pediatr*, 1997; 34: 213-9.
6. Drummond P, Clark J, Wheeler J, Galloway A, Freeman R, Cant A. Community acquired pneumonia-a prospective UK study. *Arch Dis Child* 2000; 83: 408-12.
7. Kumar N, Singh N, Locham KK, Garg R, Sarwal D. Clinical evaluation of acute respiratory distress and chest wheezing in infants. *Indian Pediatr* 2002; 39: 478-83.
8. Gupta D, Mishra S, Chaturvedi P. Fast breathing in the diagnosis of pneumonia-a reassessment. 1996; 42: 196-9 *J Trop Pediatr* .
9. Margolis P, Gadomski A. The rational clinical examination. Does this infant have pneumonia? *JAMA* 1998; 279: 308-13.
10. Palafox M, Guiscafre H, Reyes H, Mufioz O, Martinez H. Diagnostic value of tachypnoea in pneumonia defined radiologically. *Arch Dis Child* 2000; 82: 41-5.
11. Reddaiah VP, Kapoor SK. Acute respiratory infections in under five: Experience at comprehensive rural health services project hospital Ballabgarh. *Indian J Community Med* 1995; 20: 1-4.
12. Lamberti LM, Grković IZ, Walker CL, Theodoratou E, Nair H *et al*. Breastfeeding for reducing the risk of pneumonia morbidity and mortality in children under two: a systematic literature review and meta-analysis. *BMC Public Health*. 2013; 13(Suppl 3): S18.
13. Ramachandran P, Nedunchelian K, Vengatesan A, Suresh S. Risk factors for mortality in community acquired pneumonia among children aged 1-59 months admitted in a referral hospital. *Indian Pediatr* 2012; 49:889-95.
14. Deivanayagam N, Nedunchelian K, Ramaswamy S, Sudhandirakannan, Ratna SR. Risk factors for fatal pneumonia: A case control study. *Indian Pediatr*, 1992; 29: 1529-32.