International Journal of Contemporary Pediatrics
Rahman MA et al. Int J Contemp Pediatr. 2019 May;6(3):1270-1275
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20192026

Original Research Article

Study of risk factors leading to poor outcomes in severe pneumonia age 2M-60M in a tertiary care hospital

Mohammed Abdul Rahman, Sowjanya Bhanu Veera*, Venkata Priyanka Dandugula

Department of Paediatrics, Siddhartha Medical College, Vijayawada, Andhra Pradesh, India

Received: 25 February 2019
Accepted: 01 April 2019

***Correspondence:**
Dr. Sowjanya Bhanu Veera,
E-mail: vsbhanu91@gmail.com

ABSTRACT

Background: Childhood pneumonia is the single leading cause of mortality in children aged less than 5 years. Most cases occur in India (43 million); pneumonia is responsible for about 19% of all deaths in children aged less than 5 years. According to Child Health and Epidemiology Reference Group (CHERG) latest estimates, Pneumonia was responsible for 0.397 million of a total estimated 1.682 million under-five deaths in India.
Methods: A hospital based prospective longitudinal study. In the present study 200 cases belong to age group 2 months to 5 years fulfilling WHO criteria for pneumonia who were attended to the department of paediatrics, Siddhartha medical college from January 2017 to January 2018 were evaluated the risk factors in relation to their outcomes after obtaining consent
Results: Out of 200 children with severe pneumonia 11 risk factors are studied for significance against outcomes like Death of the patient, mechanical ventilation oxygen supplementation, hospital stay of patient and total duration of illness, Risk factors found to be significant are maternal literacy ($p = 0.0002617$), malnutrition ($p < 0.00001$), exclusive breastfeeding ($p < 0.05$), low birth weight ($p < 0.05$), immunisation ($p = 0.01$).
Conclusions: Severe malnutrition, maternal illiteracy, exclusive breast feeding, improper immunization and low birth weight are having a significant association with poor outcomes in children with severe pneumonia. Proper preventive strategies to decrease the incidence of these risk factors can help in increasing the survival rate of children with severe pneumonia.

Keywords: Risk factors, Severe pneumonia

INTRODUCTION

Pneumonia is a disease known to mankind from antiquity. Pneumonia is an acute inflammation of the pulmonary parenchyma that can be caused by various infective and non-infective origins, presenting with physical and radiological features compatible with pulmonary consolidation of a part or parts of one or both lungs.[1] Pneumonia signifies a pulmonary inflammatory process. The most significant and striking feature of which is consolidation. Community-acquired pneumonia (CAP) is defined as pneumonia acquired outside hospital or healthcare facilities. Clinical diagnosis is based on a group of signs and symptoms related to lower respiratory tract infection with the presence of fever >38ºC (>100ºF), cough, dyspnea, expectoration, pleuritic chest pain and physical examination may reveal focal areas of bronchial breathing and crackles. The frequency of each symptom is quite variable.[2-9]

Childhood pneumonia is the single leading cause of mortality in children aged less than 5 years. The

incidence in this age group is estimated to be 0.29 episodes per child-year in developing and 0.05 episodes per child-year in developed countries. This translates into about 156 million new episodes each year worldwide, of which 151 million episodes are in the developing world. Most cases occur in India (43 million); pneumonia is responsible for about 19% of all deaths in children aged less than 5 years, of which more than 70% take place in sub-Saharan Africa and south-east Asia.[10]

Although based on limited available evidence, recent studies have identified *Streptococcus pneumonia*, *Haemophilus influenzae* and respiratory syncytial virus as the main pathogens associated with childhood pneumonia10 According to the Child Health Epidemiology Reference Group (CHERG) latest estimates for 2010, pneumonia was responsible for 0.397 million of total estimated 1.682 million under-5 deaths in India.[11]

In India pneumonia was responsible for about 18% of all under-five deaths.[12] In Andhra Pradesh alone 55308 were affected due to pneumonia, and 29137 were males, and 26171 were females, and among them, 189 died of pneumonia, of which 107 were males, and 82 were females.[12]

METHODS

This is a hospital based prospective study of severe pneumonia (200) in children aged 2 months to 5 years conducted at Tertiary care centre, GGH, Siddhartha Medical College, Vijayawada, Andhra Pradesh.

Source of data

Children admitted in tertiary care centre, GGH, Siddhartha medical college, Vijayawada with a clinical diagnosis of severe pneumonia as per WHO criteria from January 2017 to January 2018.

Inclusion criteria

- Children with Pneumonia from 2 months to 60 months of age.

Exclusion criteria

- Children less than 1 month and more than 60 months of age.
- Children with any underlying chronic respiratory or cardiac illness
- Congenital malformations
- Failure to give consent.

Method of collection of data

Children in the age group of 2 months to 60 months admitted with severe pneumonia during the study period were enrolled in the study. A detailed anthropometry was done, and malnutrition was graded according to Indian Academy of paediatrics classification.

The recruited patients examined, and parents/caretakers were interviewed to know the living conditions of the patients, socioeconomic status, associated risk factors and their clinical and treatment history were recorded to evaluate the treatment outcome with respect to variables as follows:

Age, sex, place of residence, family income, maternal educational status, paternal education status, housing/living conditions, nutritional status, immunization status, history of pneumonia, breastfeeding status, duration of illness, duration of hospital stay, mechanical ventilation, oxygen supplementation.

Statistical analysis

Data was analysed using statistical package for social sciences (SPSS, version 20). Appropriate tables and graphical representations were used to display the data. Chi-square test was used a “p” value <0.05 taken as significant.

RESULTS

A total of 200 children with severe pneumonia were included in the study and their parents were interviewed. Out of 200, the male patients were accounted for 119 (59.5%). When coming to mother literacy 131 (65.5%) are literate and 69 (35.5%) are illiterate. For fathers 142 (71%) are literate and 58 (29%) are illiterate. Among 200 children, 88 (44%) were fully vaccinated, 112 (56%) were partially vaccinated and not vaccinated at all. Among the children EBF are 147 (73.5%) and Non-EBF are 53 (26.5%). Among the children Malnutrition (PEM) was found as Normal-48 (24%), grade I-57 (28.5%), grade II-59 (29.5%), grade III-23 (11.5%) and grade IV-13 (6.5%).

Socio economic status of children found as 76 (38%) belong to grade II and III and 124 (62%) belong to Grade IV and V. Among the children 157 (78.5 %) are with normal birth weight and 43(21.5%) are with low birth weight. For socio economic parameters it is observed that among 200 children for cooking fuel gas is used for 65 (32.5%) and non gas fuel for 135 (67.5%) children Houses for which electricity facility is available are 110 (55%) and 90 (45%) without electricity.

Children who lived in houses with attached kitchen in the living room are 121 (61.5%) and separate kitchen 79 (39.5%). Among the children, anaemia was present in 120 (60%) children and in 80 (40%) members no anaemia was found. Overcrowding was observed in the majority of the families 157 (78.5%) children were in overcrowded houses and 43 (22%) children houses are not overcrowded.

Among the 200 children, 182 (91%) were discharged and 18 (9%) died. Majority of the children (157 members) stayed less than 5 days. The above mentioned risk factors are studied for significance against the outcomes like Death of patient, Mechanical ventilation of the patient, Oxygen supplementation, Hospital stay of the patient and Total illness duration and the parameters which are found significant along with the data is mentioned in the Tables (Table 1-5).

Table 1: Representing risk factors and outcome.

Risk factor studied		Improved	Death	Statistical significance
Maternal literacy	Literate	125	6	χ^2 statistic is 9.057. p-value = 0.0002617. significant at p <0.05.
	illiterate	57	12	
Malnutrition	Grade 1	101	4	χ^2 statistic is 42.2023. p-value is <0.00001. significant at p <0.05.
	Grade 2	57	2	
	Grade 3	18	5	
	Grade 4	6	7	
Exclusive breast feeding	Yes	141	6	χ^2 statistic is 16.3844. p-value = 0.000052. significant at p <0.05.
	No	41	12	
Low birth weight	Yes	149	8	χ^2 statistic is 13.5925. p-value =0.000227. significant at p <0.05.
	No	33	10	
Immunization	Fully immunized	85	3	χ^2 statistic is 5.9976. p-value =0.014326. significant at p <0.05.
	Improper	97	15	

Table 2: Representing risk factors and mechanical ventilation.

Risk factor studied		Mechanical ventilation not needed	Mechanical ventilation needed	Statistical significance
Maternal literacy	Literate	120	11	χ^2 statistic is 4.668. p-value = 0.003073. significant at p <0.05
	illiterate	56	13	
Malnutrition	Grade 1	100	5	χ^2 statistic is 52.5302. p-value is <0.00001. significant at p <0.05.
	Grade 2	55	4	
	Grade 3	16	7	
	Grade 4	4	9	
Exclusive breast feeding	Yes	136	11	χ^2 statistic is 10.7179. p-value =0 .001061. significant at p <0.05.
	No	40	13	
Low birth weight	Yes	145	12	χ^2 statistic is 13.1253. p-value = 0.000291. The significant at p <0.05
	No	31	12	
Immunization	Fully immunized	83	5	χ^2 statistic is 5.9404. p-value =0 .014798. significant at p <0.05.
	Improper	93	19	

DISCUSSION

In our study, malnutrition was found to be very significantly associated with poor outcomes in severe pneumonia, which is comparable to other studies. Malnourished children have defective cell-mediated immunity secondary to thymo lymphatic depletion leading to severe gram-negative infections and sepsis. They may also have qualitatively abnormal immunoglobulins and impairment of key enzymes involved in the bactericidal action of leukocytes.[13] In a study done in New Delhi, Sehgal et al, also revealed severe malnutrition as the predictor of mortality in ALRI in under five children.[17] A similar study conducted by Broor et al, observed that children with severe malnutrition were at 1.85 times (odds ratio: 1.85; 95%

confidence interval: 1.14-3.0) greater risk of developing ALRI as compared to children with mild or normal nutritional status.[14] Overall, malnutrition is associated with a two to three-fold increase in mortality from ALRI.[15-17]

Table 3: Representing risk factors and oxygen supplementation.

Risk factor studied		Oxygen supplementation <3 days	Oxygen supplementation >3 days	Statistical significance
Maternal literacy	Literate	109	22	χ^2 statistic is 4.9827. p-value = 0.025602. significant at p <0.05.
	illiterate	48	21	
Malnutrition	Grade 1	101	4	χ^2 statistic is 119.7222. p-value is <0.00001. significant at p <0.05.
	Grade 2	52	7	
	Grade 3	3	20	
	Grade 4	1	12	
Exclusive breast feeding	Yes	122	25	χ^2 statistic is 6.6355. p-value = 0.009997. significant at p <0.05
	No	35	18	
Low birth weight	Yes	129	28	χ^2 statistic is 5.8136. The p-value =0.015903. significant at p <0.05
	No	28	15	
Immunization	Fully immunized	79	9	χ^2 statistic is 11.8316. p-value = 0.000582. significant at p <0.05.
	Improper	78	34	

Table 4: Representing risk factors and hospital stay.

Risk factor studied		Hospital stay <4 days	Hospital stay 4 - 10 days	Hospital stay >10 days	Statistical significance
Maternal literacy	Literate	109	17	5	χ^2 statistic is 18.8236. p-value = 0.000082. significant at p <0.05
	illiterate	43	10	16	
malnutrition	Grade 1	92	9	4	χ^2 statistic is 87.7827. p-value is <0.00001. significant at p <0.05.
	Grade 2	49	8	2	
	Grade 3	10	8	5	
	Grade 4	1	2	10	
Exclusive breast feeding	Yes	117	20	10	χ^2 statistic is 8.168. p-value =0.01684. significant at p <0.05.
	No	35	7	11	
Low birth weight	Yes	128	17	12	χ^2 statistic is 12.4741. p-value = 0.001956. significant at p <0.05
	No	24	10	9	
immunization	Fully immunized	75	8	5	χ^2 statistic is 6.7583. p-value=0.034076. significant at p <0.05.
	improper	81	19	16	

Maternal illiteracy is also associated with poor outcomes in our study. In a study done by Ballard TJ et al, and study done by Bekele F et al, paternal literacy is associated with poor outcomes which are comparable to this present study.[17,18]

In present study lack of Exclusive breastfeeding has shown significant association with poor outcomes. These findings are comparable to studies done by Sehgal et al, and Broor et al, where they found lack of breastfeeding as a significant risk factor for ALRTI.[13,14]

In present study improper or no immunization has shown significant association for poor outcomes. A similar association of improper immunization with ALRI is found in studies done by Savitha et al, Ballard TJ et al, Bekele F et al.[16-18]

Table 5: Representing risk factors and total duration of illness.

Risk factor studied		Total duration of illness < 5 days	Total duration of illness 5 - 10 days	Total duration of illness > 10 days	Statistical significance
Maternal literacy	Literate	110	16	5	χ^2 statistic is 10.4146. p-value = 0.005476. significant at p <0.05
	illiterate	44	19	6	
Malnutrition	Grade 1	93	9	3	χ^2 statistic is 65.3887. p-value is <0.00001. significant at p <0.05
	Grade 2	49	9	1	
	Grade 3	11	10	2	
	Grade 4	1	7	5	
Exclusive breast feeding	Yes	128	13	6	χ^2 statistic is 9.7044. p-value = 0.007811. significant at p <0.05.
	No	36	12	5	
Low birth weight	Yes	131	20	6	χ^2 statistic is 17.1315. p-value = 0.000191. significant at p <0.05
	No	23	15	5	
Immunization	Fully immunized	76	10	2	χ^2 statistic is 8.1464. p-value = 0.017023. significant at p <0.05.
	Improper	78	25	9	

In this study, low birthweight is also found to have a significant association with poor outcomes.

CONCLUSION

Severe malnutrition, maternal illiteracy, exclusive Breast Feeding, improper immunization and low birth weight are having a significant association with poor outcomes in children with severe pneumonia. Improvement in these risk factors will reduce the prevalence of pneumonia and will be helpful in better hospitalisation outcomes.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Bansal S, Kashyap S, Pal LS, Goel A. Clinical and bacteriological profile of Community-acquired pneumonia in Shimla, Himachal Pradesh. Indian J Chest Dis Allied Sci. 2004;46:17-22.
2. Diaz A, Barria P, Niederman M, Restrepo MI, Dreyse J, Fuentes G, et al. Etiology of community-acquired pneumonia in hospitalised patients in Chile: The Increasing prevalence of respiratory viruses among classic pathogens. Chest. 2007;131:779-87.
3. Javed S, Chaudhry R, Passi K, Sharma S, KP Dhawan B, Dey AB. Serodiagnosis of Legionella infection in community-acquired pneumonia. Indian J Med Res. 2010 Jan;131:92-6.
4. Shah BA, Singh G, Naik MA, Dhobi GN. Bacteriological and clinical profile of Community-acquired pneumonia in hospitalized patients. Lung India. 2010;27:54-7.
5. Müller B, Harbarth S, Stolz D, Bingisser R, Mueller C, Leuppi J, et al. Diagnostic and prognostic accuracy of clinical and laboratory parameters in community-acquired pneumonia. BMC Infect Dis. 2007;7(1):10.
6. Metlay J P, Fine M J. Testing strategies in the initial management of a patient with community-acquired pneumonia. Ann Intern Med. 2003;138:109-18.
7. Kyriacou DN, Yarnold PR, Soltysik RC, Self WH, Wunderink RG, Schmitt BP, et al. Derivation of a triage algorithm for chest radiography of community-acquired Pneumonia patients in the emergency department. Acad Emerg Med. 2008;15:40-4.
8. Metlay JP, Schulz R, LiYH, Singer DE, Marrie TJ, Coley CM, et al. Influence of age on symptoms at presentation in patients with community acquired pneumonia. Arch Intern Med. 1997;157:1453-9.
9. Seaton A, Seaton D. and AG Leich, Crofton & Douglas's. Respiratory Diseases. 5th ed. 2008:356-429.

10. Rudan I, Boschi-Pinto C, Biloglav Z, Mulholland K, Campbell H. Epidemiology and etiology of childhood pneumonia. Bull World Health Organization. 2008;86:408-16B.
11. Liu L, Johnson HL, Cousens S, Perin J, Scott S, Lawn JE, et al. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. Lancet. 2012;379(9832):2151-61.
12. National health profile. Government of India, DGHS, Ministry of health and family welfare, New Delhi. 2011.

Cite this article as: Rahman MA, Veera SB, Dandugula VP. Study of risk factors leading to poor outcomes in severe pneumonia age 2M-60M in a tertiary care hospital. Int J Contemp Pediatr 2019;6:1270-5.