ORIGINAL ARTICLE

e-ISSN: 2349-0659 p-ISSN: 2350-0964
doi: 10.21276/apjhs.2017.4.4.10

Determinants of acute lower respiratory tract infection in children aged 2 months to 5 years

R. S. Dhanasekhar[1], P. Vivekanandhan[2], P. T. Tamizh[1], S. Kirubakaran[3]

[1]Department of Pediatrics, Meenakshi Medical College Hospital and Research Institutue, Kancheepuram, Tamil Nadu, India, [2]Department of Pediatrics, Sri Venkateshwaraa Medical College Hospital and Research Centre, Puducherry, India, [3]Department of Community Medicine, Aarupadai Veedu Medical College and Hospital, Puducherry, India

ABSTRACT

Background: In India, acute lower respiratory tract infection (ALRI) is one of the major causes of death. During the year 2013, about 31.7 million cases of ALRI were reported. **Methodology:** It is a prospective study in children aged from 2 months to 5 years who were admitted to the hospital with clinical diagnosis of ALRI. A total of 100 children were included in the study. **Results:** About 54% were incompletely immunized for age. 52% belonged to families falling under low socioeconomic status (SES). Leukocytosis is 41% and only 18% positive blood culture. There is significant association seen. **Conclusion:** The present study demonstrated that there is significant association between the status of the immunization and SES with severity if pneumonia.

Key words: Pneumonia, under-five, immunization, socioeconomic status

INTRODUCTION

Acute lower respiratory tract infection (ALRI) is the leading cause of under-five childhood morbidity in the world, with nearly 150 million new episodes each year, of which India accounts for a bulk of 45 million. The mortality burden is 1.9 million childhood deaths per year, out of which India accounts for around four hundred and thousand deaths per year.[1]

The WHO Programme for ARI Control guidelines define pneumonia as cough in the presence of tachypnoea (respiratory rate >50/min in children aged 2 months to 12 months and >40/min in children aged 13-60 months) and severe and very severe pneumonia as the presence of chest indrawing and central cyanosis, lethargy, convulsions, and refusal of feeds, respectively.[2]

Certain risk factors have been implicated in the causation of ALRI in under-five children. They are nonexclusive breastfeeding, lack of age-appropriate immunization, malnutrition, crowding, low birth weight, and indoor air pollution.[1,3] In India, ALRI is one of the major causes of death. During the year 2013, about 31.7 million cases of ALRI were reported. Pneumonia was responsible for about 18 % of all "under-5 year" deaths. Hence, this study is carried out with the following objectives.

Objectives

1. To study the ALRI and its association with blood investigations.
2. To study the association between immunization with ALRI in these children.
3. To know the relation between the socioeconomic status (SES) and ALRI.

MATERIALS AND METHODS

It is a prospective study, conducted at Meenakshi Medical College Hospital and Research Institute, Tertiary Level Rural Health Care Hospital in Kancheepuram. For the duration of December 2015 to September 2016 in children aged from 2 months to 5 years who were admitted to the hospital with clinical diagnosis of ALRI as per the WHO criteria were eligible for the study. The children with ALRI from 2 months to 60 months were included and the children <2 months and more than 60 months and children with any underlying chronic respiratory or cardiac illness were excluded. A total of 100 children were included in the study.

History of immunization was elicited from parents and verified by checking the documents wherever available. SES grading was done according to modified Kuppuswamy's classification. Routine hematological investigations were done in all cases. Other specific investigations were done as per requirement in individual cases and all the cases were treated as per the standard protocol depending on the type of ALRI. The study was approved by the ethics and human research committee of the hospital. Informed written consent was obtained from at least one parent of each patient before enrolment. The statistical analysis was done using Microsoft Excel and Epi info software for percentages and frequencies. Chi-square test was performed for test of significance.

RESULTS

Table 1 describes that of the 100 ALRI cases studied, 54% were incompletely immunized for age. Very significant association was found between ALRI severity and immunization status.

Address for correspondence:
Dr. S. Kirubakaran, Department of Community Medicine, Aarupadai Veedu Medical College and Hospital, Puducherry, India

Received: 18-08-17 **Revised:** 29-08-17 **Accepted:** 08-10-17

Table 1: Correlation of immunization status and pneumonia

Immunization	Pneumonia	Severe pneumonia	Very severe pneumonia	Total
Complete for age	17	12	17	46
Incomplete for age	3	21	30	54
Total	20	33	47	100

χ^2=15.308, DF=2, *P*=0.001

Table 2: Relation between SES and pneumonia

SES	Pneumonia	Severe pneumonia	Very severe pneumonia	Total
Class I, II, and III	15	23	19	57
Class IV and V	5	10	28	43
Total	20	33	47	100

χ^2=16.258, DF=6, *P*=0.039. SES: Socioeconomic status

Table 3: Association of total leukocyte count and blood culture with pneumonia

Total leukocyte count	Pneumonia	Severe pneumonia	Very severe pneumonia	Total
Normal	14	27	18	59
Raised	6	6	29	41
Blood culture				
Positive	0	2	16	18
Negative	22	31	31	82

χ^2=15.772, DF=2, *P*=0.001

Table 2 explains that among the 100 ALRI cases studied, 52% belonged to families falling under low SES (Class 4 and 5). Significant association was found between SES and ALRI severity.

As seen above in Table 3, occurrence of leukocytosis was 41% among the ALRI cases, and association with severity of ALRI was found to be significant. Among the 100 ALRI cases, only 18% had a positive blood culture. However, highly significant association was found between ALRI severity and blood culture.

DISCUSSION

In the present study, 100 ALRI cases were studied for laboratory profile, immunization status and SES. The preventive role of immunization in ALRI prevention has been stressed upon extensively. The present study shows 54% were partially immunized children, and this is higher than the Savitha *et al.*[4] and Yousif and Khaleq[5] studies which showed 21.15% and 38.2% partially immunized children, respectively. However, the Broor *et al.*[6] study showed a strong correlation with a higher value of partially immunized children (69%). Highly significant association was found between immunization status and ALRI severity, similar to the findings of Broor *et al.*[4] and Yousif and Khaleq.[5]

The present study showed 57% of children belonged to households falling under low SES. Whereas, Savitha *et al*.[4] reported significantly more (93.27%) children belonging to low SES. Similar results were found by Cunha *et al.*[7] Significant association was found between SES and ALRI severity. Low SES probably limits awareness of care practices and access to material resources, thereby increasing the risk of infections.

Elevated total leukocyte counts for age were observed in only 41% of cases. Leukocytosis has been considered as an important, albeit nonspecific correlate of ALRI, particularly those of bacterial etiology.[8] Positive blood culture was obtained in only 18% of cases; however, significant association was found between blood culture and ALRI severity. The most common organism was *Staphylococcus aureus*. The reason why this was the most common isolate in this study might be because the majority of children with bacteremia were severely malnourished and *S. aureus* bacteremia is commonly associated with malnutrition.[9]

CONCLUSION

The present study demonstrated that there is significant association between the status of the immunization and SES with severity if pneumonia. Regarding the laboratory profile, leukocytosis and blood culture positivity were observed in a small percentage, but significant association with ALRI severity was observed for both. Effective utilization of under five clinic to ensure full immunization to the under five children. Early diagnosis and early referral to tertiary level hospital initiation helps improve the morbidity and mortality profile.

REFERENCES

1. Rudan I, Boschi-Pinto C, Biloglav Z, Mulholland K, Campbell H. Epidemiology and etiology of childhood pneumonia. Bull World Health Organ 2008;86:408-16.
2. World Health Organization. Technical Basis for WHO Recommendations on the Management of Pneumonia in Children at First Level Health Facilities. WHO/ART/91.20. Geneva: World Health Organization; 1991.
3. Broor S, Pandey RM, Ghosh M, Maitreyi RS, Lodha R, Singhal T, *et al.* Risk factors for severe acute lower respiratory tract infection in under-five children. Indian Pediatr 2001;38:1361-9.
4. Savitha MR, Nandeeshwara SB, Pradeep Kumar MJ, ul-Haque F, Raju CK. Modifiable risk factors for acute lower respiratory tract infections. Indian J Pediatr 2007;74:477-82.

5. Yousif TK, Khaleq BA. Epidemiology of acute lower respiratory tract infections among children under five years attending Tikrit general teaching hospital. Middle East J Fam Med 2006;4:48-51.
6. Suwanjutha S, Ruangkanchanasetr S, Chantarojanasiri T, Hotrakitya S. Risk factors associated with morbidity and mortality of pneumonia in Thai children under 5 years. Southeast Asian J Trop Med Public Health 1994;25:60-6.
7. Cunha AL, Margolis PA, Wing S. Community economic development and acute lower respiratory infection in children. J Health Popul Dev Ctries 2003;4:1-7.
8. Shuttleworth DB, Charney E. Leukocyte count in childhood pneumonia. Am J Dis Child 1971;122:393-6.
9. Cotton MF, Burger PJ, Bodenstein WJ. Bacteraemia in children in the south-western Cape. A hospital-based survey. S Afr Med J 1992;81:87-90.

How to cite this Article: Dhanasekhar RS, Vivekanandhan P, Tamizh PT, Kirubakaran S. Determinants of acute lower respiratory tract infection in children aged 2 months to 5 years". Asian Pac. J. Health Sci., 2017; 4(4):36-38.

Source of Support: Nil, **Conflict of Interest:** None declared.