



RISK FACTORS AND OUTCOMES OF ACUTE LOWER RESPIRATORY TRACT INFECTION IN CHILDREN AGED 2 MONTHS TO 5 YEARS

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ABSTRACT

Background: Acute Lower Respiratory Tract Infection (ALRI) is the leading cause of under-5 childhood morbidity in the world, with nearly 156 million new episodes each year, of which India accounts for a bulk of 43 million. The mortality burden is 1.9 million per year, out of which India accounts for around four hundred thousand deaths per year. **Objective:** To study the various risk factors, clinical profile and outcome of acute lower respiratory tract infections (ALRI) in children aged 2 months to 5 years. **Methods:** 100 ALRI cases fulfilling WHO criteria for pneumonia, in the age group of 2 month to 5 years were evaluated for potential risk factors, clinical profile and outcome as per a predesigned proforma in a rural medical college. **Results:** Socio-demographic risk factors like parental illiteracy, overcrowding, partial immunization and low socioeconomic status were potential risk factors. Nutritional risk factors like early and late introduction of complementary foods, anemia and malnutrition were associated with ALRI. Environmental risk factors were use of biomass fuels, inadequate ventilation at home, and lack of separate kitchen. **Conclusion:** The present study has identified various socio-demographic, nutritional and environmental risk factors for ALRI which can be tackled by effective health education of the community and effective training of peripheral health personnel.

KEYWORDS : Risk Factors; Respiratory Infections

INTRODUCTION

The WHO Program 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 months to 60 months) and Severe and Very Severe Pneumonia as the presence of chest indrawing and central cyanosis, lethargy, convulsions and refusal of feeds of respectively.^{1,2}

Tachypnoea and lower chest indrawing when applied by health workers and pediatricians as a diagnostic tool had the sensitivity of 70% and 81% respectively.³

Risk factors are: Nonexclusive breast-feeding, Lack of age-appropriate immunization, Malnutrition, Crowding, Low birth weight, Indoor air pollution.^{1,4}

Among all the children diagnosed with ALRI, 7-13% are severe enough to require hospital admission.^{5,7} Of all the children hospitalized with severe pneumonia, 51% require a hospital stay of more than 5 days, 56% need an antibiotic change, 20.5% need mechanical ventilation and the mortality is 10.5%.⁶

PATIENTS AND METHODS

Study Design:

Prospective Cohort Study.

Study Place:

Bhaskar General Hospital and Bhaskar medical college, Moinabad, RR district.

Study Duration:

January 2021 to December 2021.

Sample Size:

100 children admitted in our hospital with clinical diagnosis of ALRI as per WHO criteria.

Inclusion Criteria:

Children with ALRI from 2 months to 60 months

Exclusion Criteria:

Children with any underlying chronic respiratory or cardiac illness.

Informed consent by parents was obtained. A detailed history and physical examination were done according to a predesigned proforma. Detailed examination of each child was done including anthropometry and nutritional status according to Indian Academy of Pediatrics classification.

Routine blood investigations, chest x ray was done to categorize the ALRI into clinical entities and to detect complications, if any. Other specific investigations were done in individual cases and all the cases were treated as per the standard protocol depending on the type of ALRI.

Statistical Analysis:

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of tables and graphical representations. Chi square test was used. A "p" value <0.05 was taken as significant.

RESULTS:

Table 1: Age

| Age | Pneumonia | Severe pneumonia | V. severe pneumonia | Total |
|--------------|-----------|------------------|---------------------|-------|
| 2-12 months | 10 | 34 | 17 | 61 |
| 13-60 months | 6 | 26 | 7 | 39 |
| Total | 16 | 60 | 24 | 100 |

The predominant age group (61%) in the study was 2 to 12 months. Male preponderance with 57% of the cases. Maternal education up to primary or middle school level 57% and 22% were illiterate. Paternal education up to primary or middle school constituted 47% and 16% were illiterate

Table 2: Presenting complaints of ALRI

| Symptoms | Percentage |
|-------------------|------------|
| Fever | 90% |
| Cough | 100% |
| Breathlessness | 96% |
| Chest indrawing | 80% |
| Vomiting/diarrhea | 11% |
| Running nose | 69% |
| Wheeze | 13% |
| Refusal of feeds | 24% |
| Convulsions | 2% |

Fifty percent of cases were incompletely immunized for age. 70% cases lived in houses with overcrowding. 52% were from low socioeconomic background. 30% had history of URI in a family member in the past 2 weeks. Early and late introduction of complementary foods was found in 30% and 50% of the cases. 47% cases had Anemia, 46% had Malnutrition and 16% were Low birth weight.

77% lived in houses with pucca flooring. 40% lived in houses with inadequate ventilation and 60% utilize biomass fuel for cooking. 67% lived in houses using electricity for lighting, whereas the other 33% used biomass fuels. 69% lived in houses without separate kitchen. Smoking by any household member was present in 25% of cases.

The common presenting complaints of ALRI cases were cough, breathlessness and fever.

84% of the cases were severe and very severe pneumonia. Leukocytosis was present in only 22%, blood culture positivity was 8%.

The most common diagnosis was bronchiolitis, and other diagnoses were lobar pneumonia and bronchopneumonia, WLRI and Croup.

Oxygen supplementation was required in 84%, Mechanical ventilation was required by 8% cases.

DISCUSSION

In our study most of ALRI cases are infants (61%), similar to Savitha et al⁸, Yousif et al⁹ and Broor et al⁴ 62.5%, 58.4% and 62.5% respectively. This age group is susceptible due to waning of maternally immunity.

Male children were 64.42%, 65.8% and 73.1% in other studies^{8,9,4}. Our study had 57% males. The reason behind this may be that male children are generally cared more and thus brought earlier and more often treated.

Parental literacy extends protective effect on children and thus guard against ALRI by increasing awareness about preventive practices and early medical consultation. In our study 22% of mothers were illiterate, similar to Yousif et al and Broor et al, 16.2% & 34.8%. In our study 16% of fathers were illiterate, similar to Yousif et al and Broor et al of 16.2% & 17.4%.

In present study 50% were partially immunized, in Savitha et al and Yousif et al studies 21.15% and 38.2% were partially immunized.

In our study 70% cases homes were overcrowding, similar Yousif et al 71.6%, Savitha et al and Sikolia et al¹¹ 91.35% and 80.87% respectively.

In present study 52% of children belonged to low socioeconomic status. In Savitha et al 93.27% children belonging to low socioeconomic status. Low socioeconomic status probably limits awareness and access to material resources, thereby increasing the risk of infections.

| Study | Incomplete immunization | Overcrowding | Low SES | Anemia | Malnutrition | Biomass fuel usage |
|----------------------------|-------------------------|--------------|---------|--------|--------------|--------------------|
| Present Study | 50% | 70% | 52% | 47% | 46% | 60% |
| Yousif et al ⁹ | 38.2% | 71.6% | - | - | 19% | - |
| Broor et al ⁴ | 69% | - | - | - | 46% | - |
| Savitha et al ⁸ | 21.5% | 91.35% | 93.27% | 79.92% | 62.7% | 98.2% |
| Shah et al ¹⁰ | - | - | - | 55% | - | - |

| | | | | | | |
|----------------------------------|---|---|---|-----|---|-------|
| Sikolia et al ¹¹ | - | - | - | - | - | 71.2% |
| Ramakrishnan et al ¹² | - | - | - | 74% | - | - |

URTI in other family members within the past 2 weeks was present in 30%, Similar to Broor et al (40%). A viral URI may render the child vulnerable to developing an ALRI.

Savitha et al and Broor et al showed that early introduction of complementary foods 37.5% and 39.4% before 4 months of age and late introduction of complementary foods 20.19% and 27.4% respectively after 6 months of age were significantly associated with ALRI. In this study, 30% had early and 50% had late introduction of complementary foods.

Anemia was a main risk factor for ALRI in Savitha et al (79.92%) and the Ramakrishnan et al¹² 74% studies. This study 47% of cases were anemic, similar to the Shah et al¹⁰ (55%).

Malnutrition was found in 46% cases in our study, similar to Broor et al 40.1%, Savitha et al 62.71% and Yousif et al 19%. Caloric intake goes down in acute illnesses temporarily but longer duration of inadequate intake results in malnutrition.

CONCLUSION

The Present Study Identified

Socio-demographic risk factors: parental illiteracy, incomplete age-appropriate immunization, low socioeconomic status and overcrowding.

Nutritional risk factors: early and late introduction of complementary foods, malnutrition and anemia.

Environmental risk factors: biomass fuels, lack of separate kitchen and inadequate ventilation.

The signs and symptoms of ALRI as per the WHO ARI Control Program were found in almost all cases. leukocytosis and blood culture positivity were observed in a small percentage, but significant association with ALRI severity was observed for both. Thus, clinical signs are better diagnostic tools, though the blood tests may provide additional therapeutic and prognostic information in severe disease.

The above-mentioned factors can be countered in the following ways:

- Training of local health personnel in early recognition, treatment and referral of sick and at-risk children.
- Health education for the community regarding healthcare practices and harmful effects of biomass fuel usage and overcrowding and the importance of proper ventilation in homes.
- Effective utilization of under-fives' clinics to ensure availability of proper nutrition to combat malnutrition and anemia, and up to date immunization to under-5 children.
- Effective implementation of the existing national health programs to improve the health status of under-five children.
- Early diagnosis and treatment initiation helps improve the morbidity and mortality profile, as evidenced by the relatively low rates of mechanical ventilation and mortality in the present study.

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