

Modifiable Risk Factor in Acute Lower Respiratory Tract Infection in under 5 Children

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Abstract

Objective: Acute lower respiratory tract infections are leading cause of morbidity and mortality in under five children in developing countries. Hence presence study was undertaken to study various modifiable risk factor for acute lower respiratory tract infection in under five children. **Study Design:** Data collected from a observational study of eighty Acute Lower Respiratory Tract Infection (ALRTI) cases of age group from 2 month to 5 year fulfilling WHO criteria of pneumonia to study various modifiable risk factor. Eighty healthy control of same age group also interrogated. **Result:** The significant modifiable risk factor were parental illiteracy, low socioeconomic status, overcrowding, partial immunization, pre lacteal feed, early weaning, malnutrition, parental smoking, history of respiratory infection in family and rickets. **Conclusion:** The present study has identified various modifiable risk factors for acute lower respiratory tract infection which can be tackled by effective education of community.

Keywords: Acute Lower Respiratory Tract Infection, Children, Risk Factors, Socio Demography

1. Introduction

Acute lower respiratory tract infections are leading cause of morbidity and mortality in young children¹.

Children are considered susceptible to a host of disease and infections of respiratory tract are most common cause of morbidity and mortality in young children.

Every year acute respiratory tract infections in young children are responsible for an estimated 3.9 million death worldwide. About 90% of the ARI deaths are due to pneumonia. However, incidence of pneumonia in developed countries may be as low as 3-4%, its incidence in developing countries range between 20 to 30%¹. More than 1.1 million under 5 years of age children die from

pneumonia each year, accounting for almost 17% under-five death worldwide².

In, India in state and districts with high infant mortality rates, ARI is one of the major causes of death. Hospital records from state with higher infant mortality rates shows that up to 13% of inpatient death in paediatric ward are due to ARI. Pneumonia was responsible for about 18% of all under 5 deaths in India³.

Various factors apart from infectious agent, child's genetic and immunological status, malnutrition, low birth weight, and duration of breast feeding have been identified as pneumonia risks. Some other inciting factors are smoking habit of parents, parental literacy, household crowding, indoor smoke pollution^{4,5}.

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Many of these risk factors are amenable to corrective measures. Therefore, knowledge of these risk factors related to acquisition of ALRI will help in its prevention, through effective health education of community and appropriate initiative taken by the government, leading to a healthy community and healthy nation as a whole.

2. Materials and Methods

The present study is observational study conducted from August 2015 – December 2017 at pediatric ward and ICU of medical college and tertiary centre with sample size 80. Children with Acute Lower Respiratory Tract Infection age from 2 month to 60 months included in study.

Acute Lower Respiratory Tract Infection defined as per ARI control program as “presence of cough with fast breathing of more than 60/min in less than 2 months of age, more than 50/min in 2 months to 12 months of age and more than 40/min in 12 months to 60 months of age, duration of illness being less than 30 days”. The presence of lower chest in drawing will be taken as severe pneumonia. The presence of refusal of feeds, central cyanosis, lethargy or convulsions will be taken as very severe pneumonia.

Children less than 2 month and more than 60 months, and children with any other coexisting morbidity e.g. bronchial asthma, cystic fibrosis, tuberculosis. Children with congenital heart disease, congenital anomaly children with systemic disease, immunodeficiency, aspiration pneumonia, and foreign body inhalation also excluded from the study.

Written informed consent taken from child’s parents or guardians in both cases and controls.

History of associated risk factors like history of birth weight, breast feeding and weaning, history of smoking in the family members and history of recent upper respiratory tract infection in family, immunization. Family history of smoking and socioeconomic status by Kuppuswamy scale was also obtained.

For both cases and controls detailed history and physical examination was done to elicit various potential risk factors. Data regarding age, sex, domicile, parent’s literacy, parent’s occupation, monthly income, family type was obtained.

3. Statistical Method Used

Chi square test used, P value less than 0.05 was taken as significant and less than 0.001 taken as highly significant. The variables which were found to be statistically significant on univariate analysis, considered for Bivariate analysis and logistic regression was done.

4. Result

Table 1. Modifiable risk factor

Variables	Cases	Control	P Value
Age	N-80	N-80	
<1 Year	38 (48%)	32 (40%)	
1-3 Year	26 (33%)	31 (39%)	
3-5 Year	16 (20%)	17 (22%)	
Sex			
Male	44 (55%)	42 (53%)	
Female	36 (45%)	38 (47%)	
Locality			P < 0.05
Rural	60 (75%)	47 (59%)	
Urban	20 (25%)	33 (41%)	
Mother Literacy			P < 0.05
Illiterate	46 (58%)	29 (38%)	
Primary/High School	30 (37%)	35 (44%)	
PUC	3 (4%)	13 (16%)	
Graduate	1 (1%)	3 (4%)	
Father literacy			P < 0.05
Illiterate	26 (33%)	13 (16%)	
Primary/High School	38 (48%)	36(45%)	
PUC	9(11%)	21 (26%)	
Graduate	7 (9%)	10 (13%)	
Immunization			P < 0.001
Complete	32 (40%)	69 (86%)	
Incomplete	48 (60%)	11 (14%)	
Over crowding			P < 0.05
Present	44 (55%)	19 (24%)	
Absent	36 (45%)	61 (76%)	
Family H/O of arti			P < 0.05
Yes	14 (18%)	16 (20%)	
No	66 (83%)	64 (80%)	
Prelacteal feed			P < 0.05

Given	25 (31%)	13 (16%)	
Not Given	55 (69%)	57 (84%)	
Exclusive Bf			P < 0.05
Given	39 (49%)	55 (69%)	
Not Given	41 (51%)	25 (31%)	
Malnutrition			P < 0.05
Absent	16 (20%)	38 (48%)	
Grade 1&2	40 (51%)	26 (32%)	
Grade 3&4	21 (30%)	16 (20%)	
Rickets			P < 0.05
Present	7 (9%)	1 (1%)	
Absent	73 (91%)	79 (99%)	
Birth weight			P < 0.05
< 2.5 Kg	42 (53%)	23 (29%)	
>2.5 Kg	38 (47%)	57 (71%)	
Parental smoking			P < 0.05
Present	34 (43%)	19 (24%)	
Absent	46 (57%)	61 (76%)	
Type of family			P > 0.05
Nuclear	51 (64%)	43 (54%)	
Joint	20 (25%)	23 (29%)	
Three Generation	9 (11%)	14 (18%)	
Socioeconomics status			P < 0.05
Class I	2 (3%)	7 (9%)	
Class Ii & Iii	23 (29%)	40 (50%)	

In this study 48% of cases and 40% of controls were infants. 55% were males and 45% were females. 75% children from rural area had ALRI as compared to 25% children from urban area. 64% cases were from nuclear family. There was no significant ($P > 0.05$) association of family history ARI with ALRTI in these children. Low birth weight (< 2.5kg) had 1.8 times higher risk of developing ALRI than control. Cases that were given prelacteal feeds had 2 times higher risk of developing ALRI than control. 41(51%) cases were not given exclusive breast feeding as against 25 (31%) control. There was more number of cases (60%) who were partially immunized or unimmunized than controls (14%). Malnutrition was present in majority of cases (80%) compared to controls (52%). Rickets was present in 7(9%) of cases and 1 (1%) of controls. There were higher numbers of illiterate mothers, in cases compared to controls (58% vs. 36%) and (33%)

cases had illiterate fathers as compared to (16%) controls. 69% cases belonged to lower class (class IV + V), 29% cases

Belonged to middle class (class III + II) 44 (55%). Overcrowding was present in 55% cases and 24% controls. More number of cases exposed to parental smoking compared to controls (43% versus 24%). By using Bivariate logistic regression analysis, Variables those have p value < 0.05 are significantly added to the model like Immunization status, PEM, Father Literacy, Socioeconomic status.

5. Discussion

The present study is a hospital based study conducted for identifying the risk factors for ALRTI.

5.1 Sociodemographic Variables

In the present study ALRI was more common among infants but there was no statistical significance. In a study by Cunha *et al.*, it was reported that age less than one year was a risk factor for respiratory morbidity⁶. This might be due to the fact that in young children immunity is not well established. Other contributing factors are narrow airways, relatively short bronchial tree and incomplete development of lungs⁷.

More number of male children was affected by ALRI than females. However, in the present study there was no statistically significant association and the possibility of gender bias in seeking care cannot be ruled out which may have lead to male preponderance.

Majority of cases in our study were from rural area and there was significant association between domicile and ALRI. In our study more number of cases was from nuclear families. There was no statistically significant association between the type of family and ALRI.

There was a strong association between the parent's education and the occurrence of ALRI. This finding correlated with the findings of Hamid *et al.*⁸ Cunha *et al.*⁹ Low educational level in mothers was found to be associated with increased risk of ALRI hospitalizations and mortality in a study in Brazil¹⁰. However, in a case control study by Victoria CG¹¹, father's education was more strongly correlated than the mother's education.

A statistically significant association was found between social class and ALRI. Biswas *et al.*¹² revealed per capita income was significantly associated with ALRI.

The present study finding was similar to above study findings. Probably low socio-economic status leads to less access to social, human and material resources leading to more infections.

There was a statistically significant association between immunization and risk of ALRI. Children who were completely immunized for age were less likely to get the disease compared to children who were unimmunized / partially immunized for age. Similar results were reported by Broor *et al.*¹³; Thamer¹⁴; and Savitha¹⁵ this is because immunization against measles and pertussis may prevent infections that can lead to pneumonia as a complication. Overcrowding may increase the probability of transmission of infections among family members.

5.2 Nutritional Variables

Children with a history of low birth weight appeared to have more risk of severe pneumonia. This result is in agreement with Taylor *et al.*¹⁶ and Chan *et al.*¹⁷.

This might be due to poor pulmonary function and low immunity in LBW babies which makes them more liable to have ALRI mainly in its severe form¹⁸.

The administration of prelacteal feeds and lack of exclusive breast feeding in the first four to six months of life were independent risk factors for severe pneumonia. Similar results were found in other studies^{13,15}, but there are variations in the definition of exclusive breast feeding and its duration^{19,20,21}.

The protective action of breast milk which is well known is due to its content of bacterial and viral antibodies, macrophages synthesizing complement and lysozymes, which not only protect against severe ALRI but also protects from development of asthma and other allergic disorders.

Presence of malnutrition was significantly associated with ALRI in the present study Malnourished children have defective cell mediated immunity secondary to thymolymphatic depletion leading to severe gram negative infections and sepsis. They may also have qualitatively abnormal immunoglobulin, and impairment of key enzymes involved in bactericidal action of leucocytes.

A study in New Delhi revealed severe malnutrition as the predictor of mortality in ALRI in under five children²². Overall, malnutrition is associated with a two to three-fold increase in mortality from ALRI¹¹.

Presence of rickets was a significant risk factor for ALRI in the present study. Similar findings were

observed by Savitha *et al.*¹⁵ low levels of vitamin D have been associated with an increased risk of developing pneumonia in children²³.

In the present study history of parental smoking was significantly associated with ALRI.

6. Conclusion

In present study among socio-demographic variables like incomplete immunization for age, low education level of parents, low socioeconomic status and overcrowding, Nutritional variables like low birth weight, prelacteal feeding, lack of exclusive breast feeding for 4-6 months, malnutrition, rickets and environmental variables like parental smoking were found to be independent risk factors for ALRI by univariate analysis. By using Bivariate logistic regression analysis, the - Variables those have p value <0.05 are significantly added to the model like Immunization status, PEM, Father Literacy, Socioeconomic status.

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