

A STUDY OF RISK FACTORS OF ACUTE LOWER RESPIRATORY TRACT INFECTIONS IN YOUNG CHILDREN

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Paediatrics

Article Submitted on: 20
February 2019

Article Accepted on: 21
February 2019

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Abstract:

Background: Acute lower respiratory tract infection (ALRTI) continues to be the biggest killer worldwide of young children under 5 years of age. Objective: The objective of this study is to identify and assess the correctable risk factors for ALRTI in children under 5 years of age.

Materials and Methods: This prospective observational study was conducted in the pediatrics department of a tertiary care hospital. A sample size of 105 cases were selected. A detailed general and systemic examination (including respiratory and heart rate measurements, anthropometry and nutritional assessment) along with the routine investigations and chest X rays was done in all cases. Specific investigations were done as per requirement in individual cases and all cases were treated as per the standard protocol of ALRTI.

Results: Statistically significant risk factors identified with increased incidence of ALRTI included, low socioeconomic status, families having more than two under-five children at home, family history of smoking, respiratory infections, overcrowding, incomplete immunization for age use of biomass as fuel for cooking, and lack of ventilation,

Conclusion: The present study identifies various significant risk factors for severe pneumonia in under-five children.

Key words: Bronchiolitis, Pneumonia, Wheeze, Under-five mortality,

Introduction:

Infections of the respiratory tract are the most common problems in children. They are among common causes of morbidity and mortality in young children.¹ Acute respiratory infections (ARIs) may cause inflammation of the respiratory tract from nose to alveoli, with a combination of signs and symptoms. Acute lower respiratory tract infection (ALRTI) continues to be most common killer of

children under 5 years of age. Although the implementation of safe, effective, and affordable interventions has reduced pneumonia mortality,² Pneumonia still accounts for nearly one-fifth of childhood deaths worldwide.³⁻⁵ The incidence of pneumonia is more than 10-fold higher (0.29 episodes vs. 0.03 episodes) and the number of childhood-related deaths due to pneumonia is around 2000-fold higher in developing than in developed countries.⁶ Many correctable risk factors for ALRTI

have been identified which include poor socioeconomic status⁷, environmental factors like overcrowding, and indoor pollution. There is a need to find the association between these correctable risk factors and ALRTI at the level of health care to bring down the incidence of ALRTI. However, evidence on the association between these factors and pneumonia in children is scarce in this region; hence, we planned this study to assess the correctable risk factors for ALRTI in young children admitted to our hospital which is a tertiary pediatric hospital in Bihar.

Materials And Methods

This prospective observational study was conducted in the department of paediatrics, tertiary care pediatric hospital Darbhanga Medical College and hospital Bihar from June 2016, to May 2017. Prior approval from the institutional ethics committee was obtained. The sample size was 105 cases. Children aged 2–60 months admitted either in pediatric ward or pediatric intensive care unit with clinical diagnosis of ALRTI as per the WHO criteria were included in the study. Following children were excluded: Children <2 months and >60 months, children with bronchial asthma, congenital heart disease, pulmonary tuberculosis, and any other chronic illness. A case of ALRTI was defined as per ARI control program: Pneumonia was defined as the presence of cough with fast breathing (>50/min in 2–12 months of age and >40/min in 12–60 months of age) with no chest in drawing. Severe pneumonia was defined as fast breathing, chest in drawing, nasal flaring, grunting, and cyanosis, whereas very severe pneumonia was defined as not able to drink, convulsions, abnormally sleepy or difficult to wake, stridor in calm child, and severe malnutrition. Detailed history and physical examination was done according to a pre-designed proforma. A detailed history of symptoms such as fever, cough, rapid breathing, chest retraction, and wheezing refusal of feeds, lethargy was taken. A history of RTI in family members in the preceding¹⁴ days was recorded. Socioeconomic status grading was done according to Modified Kuppaswamy scale. A detailed examination of each child was done for the respiratory rate and heart rate for 1 min when quiet. A detailed anthropometry was done and malnutrition was graded according to Indian Academy of Pediatrics Classification. Severity of respiratory distress was assessed in each child. Routine hematological investigations including complete blood count (CBC) with chest X-rays were done in all cases to know the type of ALRTI. All the

cases were treated as per the standard protocol of ALRTI

Results

The results of each factor and its incidence or occurrence are as follow. As regard to the final diagnosis of the 105 cases with ALRTI, 33.2% of cases had bronchiolitis, 30.1% of cases had bronchopneumonia, 10.3% of cases had lobar pneumonia, 25.1% of cases had wheeze-associated lower respiratory infection, and 1.3% had empyema. Area of residence, religion, type of family, and literacy of both parents have significant association with ALRTI. Lower middle and upper lower class, families having >2 under five children at home, incomplete immunization for age, and family history of upper RTI in the preceding two weeks were found to be significantly associated with RTI in the study. Family history of smoking, inadequate ventilation in their house, not having a separate kitchen and cooking their food in the living place, using cooking fuel other than liquid petroleum gas, and overcrowding were variables found to be much significantly in study group.

Discussion

In our study, most of the ALRTI cases were infants (55.1%), similar to previous studies by Savitha et al.⁸ and Thameret al.⁹, where infants with ALRTI constituted 62.5% and 58.4% of cases, respectively. This might be due to the fact that in younger children, immunity is not well established and also because of narrow airways, relatively short bronchial tree. Male (61%) preponderance in cases was seen in our study, similar to many previous studies such as Savitha et al.⁸, Thameret al.⁹, and Brooret al.¹⁰ Majority of the cases in our study were from rural area. The similar result was reported by Thamer et al.,⁹ As seen in other studies⁸⁻¹⁰ which reported higher illiteracy rates among both the parents and their strong association with ALRTI, we also found similar results in this study. A significant association was found between social class and ALRTI showing that the risk of severe ALRTI increases as the socioeconomic class worsens. In our study, 65.7% of children were living under low socioeconomic status (class III and IV). Many other studies^{7,13} also showed that significantly more children were belonging to low socioeconomic status. In a study by Rahman et al.,¹⁴ poverty was significantly associated with the occurrence of pneumonia and Biswas et al.¹⁵ revealed low per capita

income being significantly associated with ARI. Similar to other studies,^{8,10} the present study also identifies families having more than two under-five children at home, to be a statistically significant risk factor for ALRTI. In the present study, 63% of cases were partially immunized children, which is similar to other studies.^{9,13} Broor et al.¹⁰ showed that more (69%) children were partially immunized. Family H/O respiratory infections (≤ 2 weeks) was another significant risk factor in our study. Similar results were found by Broor (40%) et al.¹⁰ study, whereas in the study done by Hemagiri et al.¹⁶ in Karnataka, only 14.4% were exposed to respiratory infection in family members within the past 2 weeks. History of LRTI in family was an independent risk factor for ALRTI which probably results from family members sharing common. History of URI in the mother or siblings was associated with higher risk of ALRTI in cases with most cases of URI being caused by viral infections that are highly contagious and likely to occur in many members of the family and may predispose a child to ALRTI. In the present study, there was a significant association between overcrowding (66.2% cases) and ALRTI, while other studies reported higher percentages of over crowding.^{8,9} Overcrowding may increase the probability of transmission of infections among family members. Similar to other studies,⁸ we found that 69.5% of cases did not have adequate ventilation in their house. A total of 29.2% of ALRTI cases used biomass fuels such as firewood, cow dung, and kerosene as fuel for cooking in our study, which was higher in other studies.⁸ Savitha et al.⁸ and Broor et al.¹⁰ showed that early weaning (37.5% and 39.4%, respectively) before 4 months of age and late weaning (20.19% and 27.4%, respectively) after 6 months of age were significantly associated with ALRTI. Anemia was a very significant risk factor for ALRTI in studies done by Savitha et al.,⁸ which was similar to our study which showed 62.7 % of cases being associated with anemia.

Conclusion

The present study identifies risk factors for acute respiratory infection in young children, and they represent the ultimate determinants of a large proportion of the burden of severe ALRTI.

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