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Pediatrics

"A RETROSPECTIVE STUDY OF RISK FACTORS FOR PNEUMONIA IN UNDER FIVE CHILDREN IN SOUTH-EASTERN RAJASTHAN, INDIA"

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ABSTRACT

Background: Pneumonia is a leading cause of morbidity and mortality in under-five children in developing countries. As the burden of pneumonia is high for health care system, it is important to identify the modifiable risk factors for effective prevention in community.

Objective: To identify modifiable risk factors of pneumonia in children of 2 months to 5 years age.

Methodology: A retrospective study was conducted at J.K.Lon Hospital, Kota over a period of 12 months. Total 246 cases were fulfilling WHO criteria for pneumonia, in the age group of 2 months to 5 years were interrogated for potentially modifiable risk factors.

Results: The significant risk factors for pneumonia were age < 1 year, lower socioeconomic status, lack of immunization and low birth weight (p value is < 0.05 for each risk factors). Faulty feeding was significantly associated with occurrence of pneumonia (p<0.05). Malnutrition and anemia was also independent risk factors (p<0.05). Overcrowding was single most common environmental risk factor for pneumonia (p<0.05).

Conclusion: This study has identified various modifiable risk factors for pneumonia, which can be tackled by effective preventive strategy and strong political commitment.

Introduction

Acute lower respiratory tract infections (ALRI) are the leading cause of morbidity and mortality in children under 5 year of age [1]. The occurrence of pneumonia is higher in developing country like India. Also, number of deaths due to pneumonia is higher. This is due to high prevalence of anemia, malnutrition, overcrowding and indoor pollution in developing countries [2]. The burden that pneumonia places on families and health care system in turn exacerbates inequalities [3].

The Global Action Plan for Prevention and Control of Pneumonia (GAPP) has been developed by WHO and UNICEF (2009) to increase the awareness of pneumonia. The goal of the GAPP is that every child is protected against pneumonia through a healthy environment, and has access to preventive and treatment measures. As pneumonia is a major cause of child death, GAPP call for scaling up the use of interventions of proven benefit, and provide guidance on how this can be done.

Apart from infectious agent and immunity of child, certain other risk factors such as malnutrition, anemia, and feeding pattern including duration of breast feeding have been identified as pneumonia risks. Some other inciting factors are overcrowding, indoor smoke and smoking habit of parents [4]. Many of these risk factors are preventable. Therefore, identification of these risk factors will help in its prevention in community. An appropriate initiative can be taken by the government, leading to a healthy community and healthy nation as a whole.

However, evidence on the association between these factors and pneumonia in children is scarce in this region. Therefore, this study was planned to identify various modifiable risk factors for pneumonia in children less than five of age.

Material and Method:

A retrospective study was done over a period of 12 months at department of pediatrics in J.K. Lon Hospital, Kota. Approval for the study was obtained from the College Ethics Committee. Previous 12 months hospital statistics showed that the proportion of pneumonia cases among total hospital admissions of children below 5 years was 30%. Based on this, sample size calculated as per the formula, $n = Z^2pq/e^2$. Where n=sample size, Z=1.96 point on the normal, distribution at 95% confidence level, p (proportion of cases)=30%, e (allowance of error)=6.25.

Total 240 children of 2 to 60 months of age of both genders were enrolled for the study. All cases of pneumonia were defined and

diagnosed according to WHO criteria. Controls were normal siblings of children admitted for non-respiratory complaints as well as those attending immunization clinic and OPD for non-respiratory complaint without previous history of severe or very severe pneumonia. A detailed history and systemic examination was carried out. Immunization for age was elicited by checking the immunization card and children were classified as complete, incomplete and unimmunized. Data were collected was recorded in a pre-structured preformed.

Exclusion criteria were as follows; (i) children less than 2 months and more than 5 years of age (ii) children who were known case of pulmonary tuberculosis, bronchial asthma and/or congenital heart disease (iii) history of aspiration or foreign body inhalation (iv) prior surgery for any cardio respiratory cause (v) Any other chronic illness and (vi) whose parents not willing to co-operate.

Data were plotted on Microsoft® Excel spreadsheet. Statistical analysis was performed by using SPSS software. Association of each of the categorical variable with pneumonia was assessed with Chi-square test and the strength of their association was computed by 95% confidence interval. Statistical analysis was done on all parameters to find out association.

Results:

Majority of the children 41.4% were between the age group of 2-12 months with 64.22% of them from the rural areas. 55.7% cases were male and rest cases were female. Male to female ratio was 1:2. Around 57.7% of the children were Hindu by religion. Among total 246 cases, 91.46% belonged to lower socioeconomic status. Socio-demographic profile of the study population is given in Table 1.

Only 25.2% case of pneumonia had appropriate feeding, rest 74.79% cases had history of faulty feeding. 56.07% of cases were completely immunized as for age, rest were either incompletely immunized or not immunized. 57.3% cases were low birth weight (<2499 gm) babies.

Malnutrition was present in 155 cases (63.08%) while only 59 controls were malnourished (Table 2). There was a very significant association between nutritional status and pneumonia. Anemia was present in 186 (75.6%) of cases as compared to 147 of controls. There was a significant association between anemia and pneumonia.

Table 1: Host Factors and Socio-demographic Profile of

Study Population

Host Factors		Case (246)	Control (246)	P value
Age	2 mo-1 year	102	94	P < 0.05
	1-3 years	91	96	
	3-5 years	53	83	
Sex	Male	137	149	P > 0.05
	Female	109	97	
Place	Rural	158	173	P > 0.05
	Urban	98	73	
Religion	Hindu	142	109	P < 0.05
	Muslim	93	121	
	Others	11	16	
Socioeconomic Status	Lower	225	133	
	Middle	19	96	
	Upper	2	17	
Feeding Pattern	Appropriate Feeding	62	126	
	Faulty Feeding	184	120	
Immunization status	Incomplete	96	49	P < 0.05
	Complete	138	176	
	Unimmunized	12	21	
Birth weight	< 2499 gms	141	103	
	> 2500 gms	135	143	
Nutritional status	Malnutrition	155	59	
	Normal	91	187	
Anemia (Hb <11.0 g/dl)	Mild (Hb 10-10.9)	122	73	P < 0.05
	Moderate (Hb 7-9.9)	54	56	
	Severe (Hb < 7)	10	18	
	No (Hb > 11.0)	60	99	

Among the environmental factors, occurrence of pneumonia was mostly contributed by overcrowding followed by smoking by parents and indoor pollution. About 74.4% cases were residing at overcrowded households. Contribution to occurrence of pneumonia by indoor pollution and smoking by parents were 43.5% and 51.2% respectively.

Table 2: Influence of Environmental Factors on Pneumonia

Environmental Factors	Case (246)	Control (246)	P value
Indoor pollution (cooking fuel)	107	84	P < 0.05
Smoking by parents	126	62	
Overcrowding	183	105	

Discussion:

In present study, age less than 1 year and lower socio economic status was significantly associated with occurrence pneumonia as these both groups are vulnerable for infection. In present study, faulty feeding and lack of age appropriate immunization also proved to be a significant risk factor for pneumonia. Among the affected children significant proportion were low birth weight babies [1,2,3].

In present study, malnutrition was significantly associated with pneumonia, which is comparable to other studies [4]. Malnourished children have defective humoral and cell-mediated immunity leading to severe infections and sepsis. Severe malnutrition is a predictor of under five mortality due to ALRI [5]. Children with severe malnutrition were at 1.85 time higher risk for ALRI as compared to normal children [6]. Protein Energy Malnutrition (PEM) is associated with high case fatality rate from ALRI [7,8,9].

In the present study, there was a statistically significant association between anemia and risk of pneumonia which was similar to other studies [8]. Anemic children were more susceptible to ALRI [10, 11]. The role of anemia as a risk factor of infection is still debated. Apart from overcrowding, indoor pollution and smoking by parents were also statistically significant which was also similar to other studies [12,13,14].

Large proportion of the burden of pneumonia can be tackled through effective preventive strategy. Health education of the

community, increased access to immunization and measures to improve women literacy is preventive. Other interventions include good antenatal care, birth spacing, and promotion of exclusive breastfeeding, nutritional supplements, and appropriate family welfare services.

The limitation of the study was that the hospitalized cases may not be representative of all the cases in the community. Second, measles and vitamin A deficiency, an important risk factor for pneumonia, was not considered. Finally, because of fixed sample size, the periodicity of pneumonia could not be studied.

Conclusion: Age < 1 year, lower socioeconomic status, lack of immunization, low birth weight, faulty feeding, malnutrition and anemia was significantly associated with occurrence of pneumonia (p<0.05). Modifiable risk factors for pneumonia can be tackled by effective health education of the community and other preventive measures.

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