

Risk Factors Related to Pneumonia in Children Aged Less Than Five Years

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ABSTRACT

Objective: To study the risk factors related with pneumonia in children aged less than 5 years.

Study Design: Case control study

Place and Duration of Study: This study was conducted at the Pediatric Unit 2, Bahawal Victoria Hospital, Bahawalpur from February 2019 to September 2019.

Materials and Methods: All 300 cases of < 5 years of age, admitted to pediatrics unit 2 having being diagnosed as pneumonia along with 300 controls who were also < 5 years of age and admitted in ward due to non respiratory illnesses. Demographics along with relevant clinical data and risk factors were noted.

Results: Out of a total of 600 children (300 cases and 300 controls), majority were male 344 (57.3%). Low socioeconomic status, children of illiterate mothers, rural area of residence, respiratory tract infection in any of the family members, incomplete immunization status, low birth weight, undernutrition and smoking by family member were identified as significant ($P < 0.05$) risk factors for pneumonia whereas all other study variables were insignificantly associated with pneumonia ($p > 0.05$).

Conclusion: Low socioeconomic status, children of illiterate mothers, rural area of residence, respiratory tract infection in any of the family members, incomplete immunization status, low birth weight, undernutrition and smoking by family member were identified as significant risk factors for pneumonia in children aged less than 5 years.

Key Words: Acute Respiratory Infection, pneumonia, risk factors, undernutrition, smoking, case control study, low birth weight.

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INTRODUCTION

Acute respiratory infections are known as one of the most frequent cause of morbidity amongst children estimating between 30 to 40% of children outpatient visits as well as 20 to 30% admissions.¹⁻² Mortality associated with acute respiratory infections in developing countries figure 2 to 6 fold higher as compared to developed countries, especially in population that is aged < 5 years. In developed countries, acute respiratory infections are responsible for nearly 1/3rd deaths in children who are aged < 5 years. The main cause of mortality among respiratory infections is pneumonia.³ In published literature, an average of 6 to 8 episodes of acute respiratory infections are reported in children who are aged < 5 years.^{4,5} A variety of pathogens are involved in acute respiratory infections.

The pneumonia is most serious form of respiratory infections which is responsible for 15% mortality in children aged < 5 years.^{6,7}

The epidemiology of risk factors associated with acute respiratory infections especially with pneumonia varies geographically. These can be categorized as demographic, nutritional, socioeconomic as well clinical risk factors.⁸ Identifying possible risk factors linked with acute respiratory infections especially pneumonia in our setting may give us some direction about devising a strategy for the prevention of the disease. So this study was conducted to note the risk factors related with pneumonia in children aged less than 5 years.

MATERIALS AND METHODS

This case control study was done at Pediatric unit 2, Bahawal Victoria Hospital, Bahawalpur from 1st February 2019 to 31st September 2019. A total of 600 children (300 cases, 300 controls) were enrolled for this study. All 300 cases between ages 1 month to 5 years admitted to Pediatric unit 2 having being diagnosed as pneumonia along with 300 controls who were also between ages 1 month to 5 years of age admitted with non respiratory illnesses during the study period. Verbal consent was taken from the parents/guardians of all the participants of the study. Approval was granted from institute's ethical committee.

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Case definition of pneumonia was made as per World Health Organization criteria (Pneumonia was labeled as a case having in drawing of lower chest or rapid breathing which is more than what is expected upper limit in relation to age or both having duration less than 2 weeks).⁹ Children aged > 5 years or less than one month or having chronic respiratory illness or some other underlying chronic illness (e.g. heart failure, renal disease or hepatic disorders) or history of atopy or history of recurrent episodes of respiratory distress were excluded from the study.

SPSS version 20 was used for data handling and analysis. Demographics along with relevant clinical data and risk factors were noted. Chi square test was applied for association of the studied variables. The odds ratio and 95% confidence intervals were also calculated. P value < 0.05 was taken as statistically significant.

RESULTS

Out of a total of 600 children (300 cases and 300 controls), majority were male 344 (57.3%). 390 (65.0%) children were of age 1 to 12 months, 360 (60.0%) socioeconomic status as middle or upper, 487 (81.2%) father's educational status as literate, 469 (78.2%) mother's educational status as literate, 361 (60.2%) with area of residence as urban, 430 (71.7%) with family history of respiratory infection within 2 weeks, 447 (74.5%) with complete to date immunization status, 318 (53.0%) with no smoking by any of the close family members, 554 (92.3%) were term at birth, 514 (85.7%) born with normal birth weight, 408 (68.0%) nutrition status as normal and 365 (60.8%) without exclusive breastfeeding.

Table No.1: Demographic Factors amongst Cases and Controls

Factors	Categories	Group		P Value	Odds Ratio	OR at 95% Confidence Interval	
		Cases	Control			Lower	Upper
Gender	Male	182 (60.7%)	162 (54.0%)	0.099	1.31	0.95	1.82
	Female	118 (39.3%)	138 (46.0%)				
Age	1-12	198 (66.0%)	192 (64.0%)	0.608	1.09	0.78	1.53
	13-60	102 (34.0%)	108 (36.0%)				
Socioeconomic Status	Lower	149 (49.7%)	91 (30.3%)	<0.001	2.27	1.62	3.17
	Middle/Upper	151 (51.3%)	209 (69.7%)				
Father's Education	Illiterate	65 (21.7%)	48 (16.0%)	0.076	1.45	0.96	2.19
	Literate	235 (78.3%)	252 (84.0%)				
Mother's Education	Illiterate	80 (26.7%)	51 (17.0%)	0.004	1.78	1.20	2.64
	Literate	220 (73.3%)	249 (83.0%)				
Area of Residence	Rural	164 (54.7%)	75 (25.0%)	<0.001	3.62	2.56	5.12
	Urban	136 (45.3%)	225 (75.0%)				
Respiratory infection in Family Members	Yes	130 (43.3%)	40 (13.3%)	<0.001	4.97	3.32	7.44
	No	170 (56.7%)	260 (86.7%)				
Immunization Status	Incomplete	104 (34.7%)	49 (16.3%)	<0.001	2.72	1.85	4.01
	Complete	196 (65.3%)	251 (83.7%)				

Table No.2: Environmental and Nutritional Factors amongst Cases and Controls

Factors	Categories	Group		P Value	Odds Ratio	OR at 95% Confidence Interval	
		Cases	Control			Lower	Upper
Preterm / Term	Preterm	276 (92.0%)	278 (92.7%)	0.759	0.91	0.50	1.67
	Term	24 (8.0%)	22 (7.3%)				
Birth Weight	Low	53 (17.7%)	33 (11.0%)	0.020	1.74	1.09	2.77
	Normal	247 (82.3%)	267 (89.0%)				
Malnutrition	Undernutrition	128 (42.7%)	64 (21.3%)	<0.001	2.74	1.92	3.93
	Normal	172 (57.3%)	236 (78.7%)				
Smoking by any Family Member	Yes	182 (60.7%)	100 (33.3%)	<0.001	3.09	2.21	4.31
	No	118 (39.3%)	200 (66.7%)				
	No	182 (40.7%)	100 (33.3%)				
Exclusive Breastfeeding	Yes	113 (37.7%)	122 (40.7%)	0.452	0.88	0.64	1.22
	No	187 (62.3%)	178 (59.3%)				

When both groups were compared, lower socioeconomic status turned out to significantly associated with pneumonia as these children had 2.8 times more chance to have pneumonia as compared to controls ($P < 0.001$). Children whose mothers were illiterate were found to have 1.8 times more chance of pneumonia occurrence ($p = 0.004$). Children from rural areas had 3.6 times more chances of pneumonia ($p < 0.001$). Children with any of the family members having respiratory infection within 2 weeks had 5 times more chance of having pneumonia ($p < 0.001$). Children with incomplete to date immunization status were having 2.7 times more chance of pneumonia ($p < 0.001$). Low birth weight was also significantly associated ($p = 0.020$) with pneumonia as these children had 1.7 times more chances of having pneumonia. Children with under nutrition status had 2.7 times risk of having pneumonia ($p < 0.001$). Smoking by any of the close family member was associated with a risk 3.1 times more ($p < 0.001$) as shown in Table 1 and 2. All other study variables like gender, age, father's education status, preterm/term child and exclusive breastfeeding were insignificantly associated with pneumonia ($p > 0.05$) as shown in Table 1 and 2.

DISCUSSION

Pneumonia is documented to be one of the top 5 killers of children.¹⁰ In the present study, lower socioeconomic status, children of illiterate mothers, rural area of residence, respiratory infection in any of the family member within 2 weeks, incomplete immunization status, low birth weight, undernutrition and smoking by any close family member were identified as significant risk factors associated with pneumonia.

Poor socioeconomic status^{3,11} has been marked as a significant risk factor associated with pneumonia as was shown in the present finding. Rural area of residence is also an identified risk factor for pneumonia in children. Possible reasons could be less access to good medical care in those areas, bad hygiene, and lack of awareness as well indoor pollution related to indoor cooking.

We found respiratory infection in any of the family member within 2 weeks as significant risk factor associated with pneumonia. An Indian study¹² also documented the same when they reported that upper respiratory infection within 2 weeks to mother increased the chances of pneumonia up to 6.5 times. This risk increased to 24 times when any of the sibling had upper respiratory infection. Savitha MR et al¹³ also reported similar results. This could be because members of the close family share the same environment commonly that may contribute to transmission of infections especially in children who are < 5 years of age via respiratory droplet.

We noted a significant relation of incomplete immunization with pneumonia in the current study.

This is consistent with many of others studies conducted in the past.^{14,15} This result emphasizes the fact that appropriate immunization for every child is necessary. This again proves the lack of compliance to routine immunization by general public. Efforts should be put to increase awareness as well importance of adequate immunization in every child.

Malnutrition also turned out to be a significant risk factor associated with pneumonia in the present study. Other researchers^{10,16,17} have also noted malnutrition to increase chances of pneumonia and more importantly, these children have 2 to 3 times more risk of case fatality. Malnutrition is well documented to be causing weak immune response as well as overall poor defense against childhood diseases.

Smoking by any of the close family member exposes children passive smoking that has been documented as a type of risk factor significantly associated with pneumonia in children.^{13,18} We did not find any significance of gender with pneumonia in the current work. Many studies in the past¹⁹⁻²¹ showed boys to have more chances of having pneumonia that may be because of male gender predominance or male gender finding more access to medical services.

The current study highlighted important risk factors of pneumonia in children aged < 5 years. Most of these risk factors can be prevented by adopting simple steps like appropriate nutrition, proper immunization, prevention from pollution, parental literacy and maintaining overall hygienic status. Awareness about these preventable risk factors can reduce the burden of pneumonia in our population.

CONCLUSION

Low socioeconomic status, children of illiterate mothers, rural area of residence, respiratory infection in any of the family members, incomplete immunization status, low birth weight, under nutrition and smoking by family member were identified as significant risk factors associated with pneumonia in children aged less than 5 years.

Author's Contribution:

Concept & Design of Study:	Khawar Saeed Jillani
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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