A CASE-CONTROL STUDY: ASSOCIATION BETWEEN IMMUNIZATIONS AND SEVERE PNEUMONIA IN TERTIARY CARE FACILITY

Zareen Naz*, Faiza Siddiqui and Faiz Ahmed Siddiqui

Associate Professor, Liaquat College of Medicine and Dentistry, Karachi, Pakistan.

*Corresponding Author: Zareen Naz
Associate Professor, Liaquat College of Medicine and Dentistry, Karachi, Pakistan.
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ABSTRACT

Objective: To determine association of immunization for severe pneumonia among new born children aged 2-24 months admitted in tertiary care hospital. **Study Design:** Case-control Study. **Place and Duration:** Pediatric Ward, Dr Ziauddin University Hospital, North Nazimabad, Karachi. **Methodology:** Divided into 2 groups contain 144 patients in each group. Identified through non-probability consecutive sampling. Sample size was calculated using WHO sample size calculator and power of test was kept at 80%, P1= 7.8% and P2=1%. Data was analyzed through SPSS version **19** and p-value < 0.05 considered as significant. Association between study variables and severe pneumonia was computed using Chi Square Test. **Results:** Group A (67 males and 77 females) mean age was 13.00±6.40 months and group B (78 males, 66 females) mean age was 12.83±6.90 months. . In group-A 49.3% were immunized and 72.9% in group-B. 27.1% reported with low birth weight in group-A and 30.6% in group-B. **Conclusion:** The studied risk factors more prevalent in patients with severe pneumonia rather than controls and significantly associated with severe pneumonia. Immunization was significantly associated with severe pneumonia.

KEYWORDS: Immunization, Malnutrition, severe Pneumonia.

INTRODUCTION

Pneumonia is commonly encountered by emergency department and primary care clinicians. Childhood pneumonia remains a significant cause of morbidity and mortality in developing countries, whereas mortality rates in the developed world have decreased secondary to new vaccines, antimicrobials, and advances in diagnostic and monitoring techniques.[15]

The incidence of pneumonia varies by age groups and between developing and developed countries. Worldwide, the overall annual incidence of pneumonia in children younger than 5 years is 150 million to 156 million cases,[16,17] leading to an estimated 2 million deaths per year, most of which occur in developing countries.[18] Forty percent of cases require hospitalization.[19] In developed countries, the annual incidence of pneumonia is estimated at 33 per 10,000 in children younger than 5 years and 14.5 per 10,000 in children ages 0 to 16 years. In the United States, pneumonia is estimated to occur in 2.6% of children younger than 17 years. Fortunately, the mortality rate in developed countries is less than 1 per 1000 per year.[17] Pneumonia still remains a condition that is challenging to accurately diagnose. Therefore, no single definition that accurately describes childhood pneumonia currently exists. Pneumonia is defined as a lower respiratory tract infection (LRTI) typically associated with fever, respiratory symptoms, and evidence of parenchymal involvement by either physical examination or the presence of infiltrates on chest radiography. Pathologically, it represents an inflammatory process of the lungs, including airways, alveoli, connective tissue, visceral pleura, and vascular structures. Radiologically, pneumonia is defined as an infiltrate on chest radiograph in a child with symptoms of an acute respiratory illness.[15,21]

Community-acquired pneumonia (CAP) refers to an acute pulmonary infection in a previously healthy individual acquired in the community.

METHODOLOGY

The classification of acute respiratory tract infection[7] for children 2-59 months was used.

No pneumonia (cough and cold): The children were diagnosed to have no Pneumonia if Respiratory rate per minute was < 50 for infants aged 2-11 months and < 40 for children aged 12-59 months with no chest indrawing.[7]

Pneumonia: The children were diagnosed to have Pneumonia if respiratory rate per minute is $\geq$50 for infants aged 2-11 months and $\geq$40 for children aged 12-59 months with no chest indrawing.[7]

Severe pneumonia: Children were diagnosed to have severe Pneumonia when having chest in drawing with fast breathing.[7]

OUTPATIENT MANAGEMENT: Empiric Therapy

Antimicrobial therapy is not routinely recommended in preschool children with pneumonia (viruses are more common).[24] Because S pneumonia remains the most commonly implicated pathogen, amoxicillin or amoxicillin-clavulanate remains the most appropriate first-line antimicrobial agent used empirically for CAP in fully immunized, healthy, young preschool children with mild to moderate symptoms.[41]

This study was conducted on cases and controls admitted in the Pediatric ward of Ziauddin Hospital; fulfilling the inclusion and exclusion criteria, enrolled by consultant physician, were included in the study. Informed consent was taken from each patient's guardian to participate in this study and details about this research were explained prior to enrolment. The study was conducted according to the ethical guidelines of Pakistan Medical and Research Council (PMRC).

A proforma was used to document findings. Guardians of both cases and controls were asked to fill a proforma relating to demographics (name and age), gender, hospital registration number, initiation of breast feeding within 72hrs after

birth and mid arm circumference of the child was recorded according to recommended standard procedures. All proformas were filled by independent observer who was not participated in this study.

Data were analyzed by using SPSS version 19 software. Frequency and percentages were used to assess the categorical variables like Malnutrition (Yes/No) and initiation of breast feeding within 72hrs after birth (Yes/No). Association between subjects (cases/controls) and factors were computed using chi square test. Odds ratio along with 95% confidence interval were computed. To control the effect modifiers, stratification was done with regard to age and gender to control the effect of these factors on outcome variables (Initiation of breastfeeding after birth and malnutrition) through chi-square test. P-value < 0.05 was taken as significant. Qualitative variables were presented in terms of frequency and percentages. Quantitative variables were presented in term of mean and standard deviations. Post stratification chi square test was applied.

Children with severe Pneumonia admitted in Pediatrics ward, Dr. .Ziauddin Hospital North Campus were recruited as cases. Following were the inclusion and exclusion criteria for cases.

Inclusion Criteria for Cases

- Children with confirmed diagnosis of severe pneumonia (according to operational definition).
- Presenting within 10 days of symptoms.
- Children aged between 2 to 24 months.
- Children of either gender.
- Guardian of children willing to give informed consent.

Exclusion Criteria for Cases

- Children with no pneumonia or with pneumonia.
- Children with confirmed tuberculosis, asthma or with a diagnosis of upper respiratory infection will also be excluded.
- Children below 2 months or more than 24 months of age.
- Children who had any condition that might have been confused with pneumonia (i.e. sepsis or bacteraemia, severe anaemia, bronchiolitis, pharyngitis, tonsilitis) were excluded.(classify according to medical reports)
- Child born with multiple skeletal abnormalities, complex congenital abnormalities and chromosomal disorder were also excluded.(assess according to medical records)
- Children whose mother died at birth or within four months after birth were excluded.
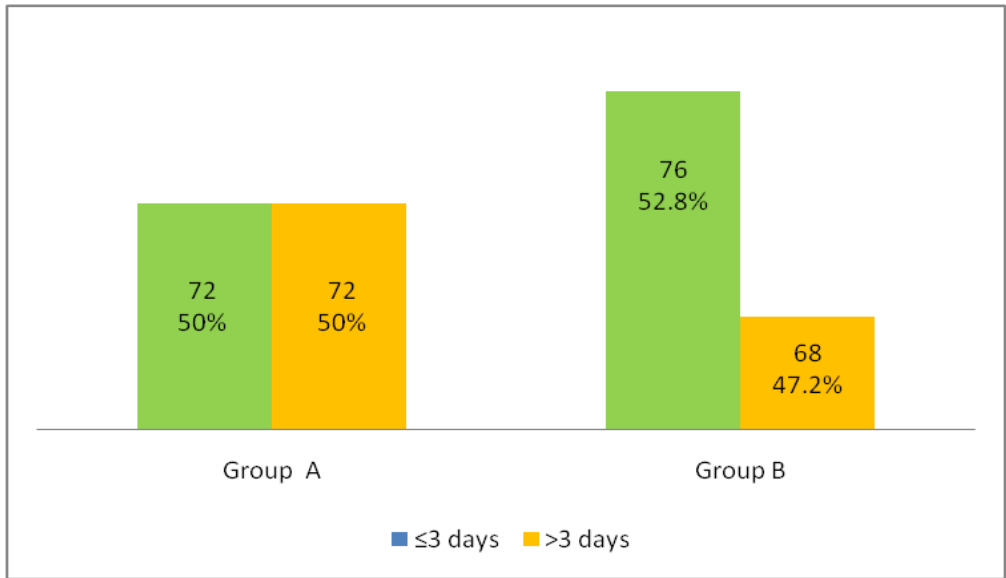
(n=288)

Group A n(%)		Group B n(%)	

		Group A n(%)	Group B n(%)
Immunization	Yes	71(49.3)	105(72.9)
	No	73(50.7)	39(27.1)

Graph – 1: Frequency and percentage of patients according to duration group of pneumonia.

Table – 2: Frequency and association of immunization with study group.

(n=288)

	STUDY GROUP		TOTAL	P-Value	Odds ratio	95% C-I
	Group A (n=144)	Group B (n=144)				
Yes (n=176)	71	105	**176**	0.000*	0.361	0.221 - 0.591
No (n=112)	73	39	**112**			
TOTAL	**144**	**144**	**288**			

Chi Square Test was applied.

P-value ≤0.05 considered as Significant.

*Significant at 0.05 level.

DISCUSSION

Receiving antibiotics at home reduced the risk of severe pneumonia. A study in Uganda where 23% had received antibiotics alone and another 25% had received antibiotics in combination with antimalarials. Those who received antimalarials only were 5.5 times more likely to have severe pneumonia.[48] This finding by Hildenwall et al implies that receiving antibiotics at home protects children from severe pneumonia. In 2004, World Health Organization recommended the treatment of non-severe pneumonia with oral antibiotics by trained community health workers at the community level.[50] A metaanalysis of clinical trials on community case management reported a 36% decline in child mortality from pneumonia when trained community health workers administered antibiotics to children under the age

of five years with pneumonia.[56] An update to the above meta analysis estimates that community case management can reduce pneumonia mortality by about 70% in children under the age of five years.[57]

CONCLUSION

Immunization: Vaccination such as pneumococcal, Hib, flu vaccine provide immunity for a child against pneumonia. No immunization of any vaccine could be a risk factor for pneumonia in children.[12]

1. **Previous history of pneumonia:** If a child previously had pneumonia, it could proved to be the risk factor for developing pneumonia later in their life.[14]

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