

A Comparative Study to Evaluate the Risk Factors for Pediatric Patients Admitted with Community Acquired Pneumonia

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Conflict of interest: Nil

Abstract

Introduction: Community acquired pneumonia is defined as pneumonia that is acquired outside the hospital. The most commonly identified pathogens are *Streptococcus pneumoniae*, *Haemophilus influenzae*, *atypical bacteria* (i.e. *Chlamydia pneumoniae*, *Mycoplasma pneumoniae*, and *Legionella species*) and viruses. Community Acquired Pneumonia (CAP) is the leading cause of mortality in children younger than five years of age in developing countries, including India. **Aim:** To evaluate the risk factors associated with Community Acquired Pneumonia (CAP) in patients admitted to the Pediatric department at a tertiary care hospital in Bihar region. **Methods:** This was a case-control study which compared patients of CAP aged 2 months to 60 months, admitted in Pediatric Upgraded Department Patna Medical College and Hospital, Patna, Bihar, India. Risk factors that were evaluated included demographic, socioeconomic, housing, past and family history, birth variables, nutritional variables, immunization, delay in presentation and previous treatment. **Results:** In the present study, 68% of males were infected with CAP in contrast to 32% of females. The majority of the cases (63%) belonged to the urban locality. Lower socioeconomic status, lower maternal and paternal education, overcrowding and indoor air pollution were associated with CAP. Basic sanitation facilities were found to be better in control groups. Birth order of 3 or more, non-institutional, preterm deliveries, significant past and family history were significantly associated with CAP. According to WHO classification, in our study, 59 had severe pneumonia while 41 had pneumonia. **Conclusion:** Public awareness should also be increased to improve the better utilization of available resources. Improving the socio-economic status of people are welcome, this can take a long time to bear fruit.

Keywords: Community Acquired, Pneumonia, Pediatrics.

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Introduction

Community acquired pneumonia is defined as pneumonia that is acquired outside the hospital. The most commonly identified pathogens are *Streptococcus pneumoniae*, *Haemophilus influenzae*, *atypical bacteria* (i.e. *Chlamydia pneumoniae*, *Mycoplasma pneumoniae*, and *Legionella species*) and

viruses. Community acquired pneumonia (CAP) is the leading cause of mortality of under-five children in developing countries, including India. Annually there are 151.8 million new cases of CAP [1]. Among these 8.7% (13.1 million) cases are severe enough to require hospitalization [1].Based

on burden of CAP, India is among the top five countries and has over 23% of the global cases [2].

Many organisms cause community-acquired pneumonia, including bacteria, viruses, and fungi. Pathogens vary by patient age and other factors, but the relative importance of each as a cause of community-acquired pneumonia is uncertain because most patients do not undergo thorough testing, and because even with testing, specific agents are identified in < 50% of cases.

World Health Organization (WHO) has developed simple guidelines for the identification of CAP by community health workers [3]. According to these guidelines, CAP is defined as presence of fast breathing above age-specific cut-off. The cut-off for infants less than 2 months is 60 more breaths per minute (bpm), for 2–11 months of age 50 or more bpm and 12–59 months of age is 40 or more bpm. In addition, WHO has defined severe pneumonia as CAP with presence of certain danger signs such as not able to drink, persistent vomiting, convulsions, lethargy or unconsciousness, stridor in a calm child or severe malnutrition. Children with fast breathing with or without chest in-drawing are classified as “pneumonia” and children with pneumonia and with any danger signs are classified as “severe pneumonia” [3].

CAP contributes to 0.44 million deaths of under-five children in South East Asian region [4]. Child Health Epidemiology Reference Group’s (CHERG) pneumonia working group published estimates on morbidity and mortality of clinical pneumonia for 192 countries including India [5]. Lack of reliable estimates of CAP from Indian states would hamper assessment of impact of various strategies for its prevention or treatment. Hence, the current retrospective study was done to estimate the incidence of CAP in two districts each within the states of Uttar Pradesh and Bihar, India. These states have

poor maternal and child health indicators [6].

Methodology:

This is a questionnaire-based case-control study conducted in Upgraded Department of Paediatrics, Patna Medical College and Hospital, Patna, Bihar, India

Patients of Community-Acquired Pneumonia aged 2 months to 60 months who were admitted to the Pediatric Department Patna Medical College and Hospital, Patna, Bihar, India was taken as cases. One unmatched control per case was taken from healthy children between the ages of 2 months to 60 months of age. All the cases of community-acquired Pneumonia aged 2 months to 60 months who were admitted to the Upgraded Department of Paediatrics in pmch

Inclusion criteria: As per WHO classification¹, all patients with pneumonia and severe pneumonia aged 2 months to 60 months requiring admission.

Exclusion criteria: Infants aged less than 2 months, Children aged more than 60 months, Patients of WHO classified pneumonia as requiring admission but were denied by parents.

Written consent from the parents was taken before enrolling the child on the study after that a questionnaire was administered. Risk factors that were evaluated included demographic, socioeconomic variables, housing, significant past and family history, birth variables, nutritional variables, immunization, delayed presentation, and previous treatments.

Results:

In the present study, 68% of males were infected with CAP in contrast to 32% of females. The majority of the cases (63%) belonged to the urban locality. Lower socioeconomic status, lower maternal and paternal education, overcrowding and indoor air pollution were associated with CAP. Basic sanitation facilities were found to be better in control groups. Birth order of

3 or more, non-institutional, preterm deliveries, significant past and family history were significantly associated with CAP.

Failure to exclusively breastfeed the baby for 6 months, bottle feeding, malnutrition and incomplete immunization were significantly associated with CAP.

Table 1: Distribution of Demographic Variables

(Case n1=100; control n2 =100; total n=200)

Variable		Case	Control	Total (%)
Age	<1 Year	56	64	120(60)
	>1 Year	44	36	80(40)
Gender	Male	68	56	124(62)
	Female	32	44	76(38)
Locality	Rural	37	19	56(28)
	Urban	63	81	144(72)

Various risk factors were assessed like significant past history, weight for age, overcrowding, indoor smoke, nearby health facility availability, previous treatment and duration of illness before treatment. Analysis of these factors is detailed in table 2.

According to WHO classification, in our study, 59 had severe pneumonia while 41 had pneumonia.

Table 2: Association of Severity of Pneumonia with Different Risk Factors

(Severe pneumonia n1=59; pneumonia n2 =41; total n=100)

Variable		Sever Pneumonia	Pneumonia	Total
Significant past history	Present	28	16	44
	Absent	31	25	56
Weight For Age	>-2 Sd	25	17	42
	-2 To -3 Sd	19	11	30
	<-3sd	15	13	28
Overcrowding	Present	33	30	63
	Absent	26	11	37
Indoor Smoke	Present	34	22	56
	Absent	25	19	44
Available nearby health facilities	Present	22	27	49
	Absent	37	14	51
Previously Treated	Yes	37	26	63
	No	22	15	37
Duration of Illness before admission	1-3D	15	18	33
	4-7D	27	13	40
	>7D	17	10	27

Discussion:

Pneumonia can affect anyone; however, it has been observed that children are at a higher risk of developing the disease than others. There are many risk factors which have been associated with the increased chances of CAP in children namely indoor air pollution, malnutrition, lack of

breastfeeding, low maternal education, low socioeconomic status (SES), poor access to healthcare, and concomitant illnesses etc. The purpose of our study is to determine the risk factors associated with childhood CAP in developing countries like India which has implemented many welfare and health programs in the last decade. The controlled and modified control of these risk factors

can be used in the future to reduce the mortality and morbidity caused by pneumonia in India.

Symptoms include malaise, chills, rigor, fever, cough, dyspnea, and chest pain. Cough typically is productive in older children and adults and dry in infants, young children, and older adults. Dyspnea usually is mild and exertional and is rarely present at rest. Chest pain is pleuritic and is adjacent to the infected area. Pneumonia may manifest as upper abdominal pain when lower lobe infection irritates the diaphragm. Gastrointestinal symptoms (nausea, vomiting, diarrhea) are also common. Symptoms become variable at the extremes of age. Infection in infants may manifest as nonspecific irritability and restlessness; in older patients, manifestation may be as confusion and obtundation.

Signs include fever, tachypnea, tachycardia, crackles, bronchial breath sounds, egophony (E to A change—said to occur when, during auscultation, a patient says the letter “E” and through the stethoscope the examiner hears the letter “A”), and dullness to percussion. Signs of pleural effusion may also be present. Nasal flaring, use of accessory muscles, and cyanosis are common among infants. Fever is frequently absent in older patients.

Incomplete immunization had shown to be a risk factor for CAP. It has been an undisputed fact that childhood immunizations are protective against childhood illnesses.[7] In the present study, 28% of the cases of CAP were incompletely immunized in contrast to 5.6% in the controls.

Studies from different parts of the world had reported indoor air pollution caused by indoor smoking and the use of biomass as a cooking fuel to increased respiratory morbidity in children.[8] The present study also concludes indoor air pollution as a risk factor for CAP. In our study, 56% of pneumonia cases were exposed to indoor smoke in comparison to 23% in controls

and this association was found to be significant. The severity of pneumonia was also analyzed in the present study for different risk factors, only previous treatment and delayed presentation were the two factors found to increase the severity of pneumonia.

Conclusion:

Concentrated efforts are needed to strengthen the health facilities and immunization coverage in the population. Public awareness should also be increased to improve the better utilisation of available resources. Improving the socio-economical status of people are welcome, this can take a long time to bear fruit. We should promote and ensure the implementation of several preventive measures that will have a major impact on the prevalence and complications of malnutrition and infection.

Incidence of CAP in Bihar is high, being much higher in infants. Hence there is an urgent need for introduction of preventive strategies, improving health seeking behavior and quality of care for CAP.

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