Original Research Article

Study of Clinical Profile and Outcome of Acute Lower Respiratory Tract Infection in Children Aged between 2 Months to 5 Years at SKMCH, Muzaffarpur, Bihar

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Abstract

Background: In underdeveloped nations, acute respiratory infections are the main cause of illness and mortality in children under the age of five. In order to better understand the clinical profile and factors influencing the outcome, the current investigation was conducted.

Methods: Hospital based case series study conducted at Department of Pediatrics, SKMCH, Muzaffarpur, Bihar. The study conducted from December 2021 to November 2022. Total 200 ALRI cases in the age range of 2 months to 5 years who met the study eligibility requirements for pneumonia were examined for their clinical profiles and outcomes using a predesigned proforma. The chi-square test was used to assess the data.

Results: Male children (58%) and newborns (53.5%) had a greater incidence of ALRTI cases, according to our research. PEM (60.5%) and anaemia (73.5%) were prevalent. Parental smoking, the length of EBF, and gestation at birth were all substantially ($p< 0.05$) correlated with pneumonia severity. With a mean hospital stay of 5, 7.43, and 10.36 days, pneumonia cases in the range of 1.5%, 77.5%, and 21% respectively. The need for changing medications and length of stay were substantially ($p <0.05$) correlated with the severity of pneumonia. 4.5% of cases required mechanical ventilation, while 56.5% of cases needed oxygen. The most frequent diagnosis was bronchopneumonia (33.5%), and the most frequent consequence was sepsis (6%) Death rates were 3%.

Conclusions: The incidence of several risk variables among ALRI cases as well as outcome and severity predictors have been established by the current investigation. By boosting EBF and immunisation, managing malnutrition effectively, raising living standards, and teaching parents about the dangers of smoking, ARI burden and severity can be decreased.

Keywords: ALRTI, ARI, Outcome, Pneumonia, Risk factors, WHO.

Introduction

For young children, acute lower respiratory tract infections (ALRTIs) are the main cause of morbidity and mortality [1]. The most frequent ailment in children is acute respiratory infections (ARI). More than 2 million children under the age of five die of

acute respiratory infections each year, with 90% of these deaths occurring in poor nations, according to recent estimates from the World Health Organization (WHO) [2].

With almost 156 million new episodes every year, ALRTI is the world's most common cause of illness in children under 5 years old. Of these, 43 million occur primarily in India. According to estimates, 7–13% of the 156 million cases of pneumonia that occur each year around the world may develop into serious illness and necessitate hospitalization [3]. About 0.3 million paediatric hospital deaths occurred as a result of the approximately 12 million bouts of severe and 3 million episodes of very severe ALRI that required hospital admission. Among-hospital mortality made up about 19% of the estimated total number of ALRI deaths in young children in 2010. 99% of these deaths occurred in developing nations [4].

Infectious diseases claimed the lives of 4.9 million (64%) of the 7.6 million children who died in their first five years of life in 2010. 18% of all children under the age of five who died were killed by pneumonia, and 4% of those deaths occurred in the neonatal period. The biggest number of pneumonia deaths worldwide, estimated at 4 lakh per year, happens in India [5]. The objective was to examine the clinical characteristics of ALRTI in kids between the ages of two and five, as well as the risk factors for ALRI in these kids and the outcomes predictors.

Material and Methods

A case series investigation of ALRTI in children between the ages of 2 months and 5 years who were admitted to the Darbhanga Medical College and Hospital, Laheriasarai, Bihar, from December 2021 to November 2022. Children having a clinical diagnosis of ALRTI according to WHO criteria have been admitted to our hospital. The Department of Pediatrics, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar will assess the study participants children.

According to WHO standards, the study included children between the ages of 2 months and 5 years who had been diagnosed with ALRTI. The study excluded kids with congenital cardiac conditions, TB, bronchial asthma, hospital acquired illnesses, and kids who were admitted elsewhere for the same ailment. All parents and guardians of the participants in the study will be asked verbally for their informed consent.

Results

According to the WHO ARI programme, 3 of the 200 individuals admitted with ALRI in the current study developed pneumonia, 155 of which had severe pneumonia and 42 of which had very severe pneumonia.

Table 1: Cases as per WHO ARI classification

WHO classification	No. of cases	Percentage
Pneumonia	3	1.5%
Severe pneumonia	155	77.5%
Very severe pneumonia	42	21%

Table 2: Cases as per Socio demographic factors

Variables	No. of cases	Percentage
Age <12 months	107	53.5%
Male Sex	116	58%
SES ≥3	153	76.5%
Birth order ≥3	57	28.5%

Table 3: Cases of radiological findings on chest X-ray

Chest X-ray findings	No. of cases	Percentage
U/l Infiltrates	16	8%
B/linfiltrates	67	33.5%
Consolidation	52	26%
Hyperinflation	50	25%
Collapse	32	16%
Effusion/empyema	8	4%
Pneumatocoele	2	1%
Steeple sign	6	3%
Normal	32	16%

Table 4: Final clinical diagnosis

Diagnosis	No. of cases	Percentage
Bronchiolitis	42	21%
Bronchopneumonia	67	33.5%
Lobar pneumonia	28	14%
Croup	10	5%
WALRTI	49	24.5%
Others	4	2%

Table 5: Outcome variables and pneumonia severity

Variability		Pneumonia	Severe	Very severe	Total	p-value
Change of antibiotic	Yes	0	33	24	57	0.0001
	No	3	122	18	143	
Oxygen	Yes	2	82	29	113	0.129
	No	1	73	13	87	
Duration of stay	≤7	3	92	16	111	0.004
	8-14	0	58	19	77	
	>14	0	5	7	12	
Outcome	Improve	3	148	37	188	0.094
	Death	0	2	4	6	
	DAMA	0	5	1	6	
Total		3	155	42	200	

Out of 200 cases, 67 (33.5%) had bronchopneumonia, 49 (24.5%) had WALRTI, and 42 (21%) had bronchiolitis as their most frequent clinical diagnosis. 28 (14% of cases) were due to lobar pneumonia. 10 (5%) cases of croup and 4 (2%) episodes of empyema have diagnoses. The length of the stay and the change in medications had a big impact on how severe the pneumonia was.

Discussion

In the current investigation, risk factors, clinical and laboratory profiles, complications, and outcomes were examined in 200 ALRI cases. A risk factor for a poor prognosis was discovered to be young age (infants under 12 months) [6]. In line with earlier studies by Savitha *et al*, Broor *et al*, and Sehgal *et al*, where newborns with ALRI accounted for roughly 52–62% of the population, ALRI among infants in our

research was 53.5% [7,8,11]. Due to the fading of maternal immunity in the second half of infancy, this age group is especially vulnerable. Narrow airways, a short bronchial tree, and inadequate lung development are further contributing factors. However, there was no correlation between ALRI severity and age.

In our analysis, we found that men (58%) outnumbered women (42%). In research conducted by Savitha *et al*. (64.4%), Broor *et al*. (73.1%), Sehgal *et al*. (58.25%), and Drummond *et al*. (58%), this was in comparison [7,8,11,12]. The significance of cultural influences, such as the preference for boys seeking medical attention, can presumably be used to explain this. In our study, there was no connection between sex and the severity of pneumonia.

In the current study, class III-V individuals made up 76.5% of participants, and instances with birth orders below three made up 28.5% of cases. 67% of people were exposed to indoor pollutants, ≤3.42% lived in overcrowded homes, and 66.5% defecated outside. Only 23.5% of people were housed in substandard conditions. In 43.5% of instances, parental smoking was discovered. The severity of pneumonia was only substantially correlated with parental smoking.

18% of instances in our study involved home deliveries, 16% had preterm births, and 21.5% involved low birth weight. Pre-lactational feeding were given in 20.5% of patients, and partial or incomplete vaccination was present in 26.5%. The severity of pneumonia was only substantially correlated with gestation. Preterm babies are more likely to suffer from anaemia and malnutrition, which may help to explain this.

Parental illiteracy, low socioeconomic position, crowding, and incomplete immunisation were reported by Savitha *et al*.

to be important sociodemographic risk factors for ALRI [7].

Children are more likely to live in substandard housing with smoke-producing conditions, according to Acharya *et al*. Lack of breastfeeding, low socioeconomic position, illiteracy, and malnutrition were determined by Hamid *et al*. to be the main risk factors [18,19].

In our study, 60.5% of the cases had PEM, 17% had Rickets-like symptoms, and 16% had micronutrient deficiencies such zinc, vitamin A, vitamin B12, and others. Hb was less than 11 g/dl in 73.5% of the patients. 31% of infants were not exclusively breastfed, and 33.5% of instances involved improper weaning. EBF and the severity of pneumonia were substantially correlated.

In their study, Broor S. *et al*. identified several significant risk factors for severe ALRTI, including the absence of breast-feeding, URTI in the mother or siblings, severe malnutrition, the use of cooking fuel other than LPG, the lack of age-appropriate immunisations, and a family history of ALRTI [8].

Prelacteal feeds delivery, early weaning, anaemia, malnutrition, use of kerosene lamps, pollution from biomass fuel, lack of ventilation, partial vaccination, overcrowding, and malnutrition were determined to be major risk factors by Savitha *et al* [7].

In our study, the majority of participants had fever and cough, which were present in 96.5% and 92% of cases, respectively. An altered sensorium, noisy breathing, feed rejection, and rapid breathing were all present in 42% of cases. Vomiting or diarrhoea occurred in 18% of cases. In 98% and 93% of instances, tachypnea and chest retractions were among the symptoms. Crepitations (63.5%) and wheeze (64.5%) were two other

common symptoms. 38% of patients exhibited leucocytosis.

These results were equivalent to those of investigations by Kabra and colleagues and Kumar and colleagues. In their investigation, Fatmi *et al*. discovered cough, fever, and difficulty breathing in 95% of cases. In 32% and 33% of patients, respectively, vomiting and diarrhoea were seen [9,10].

1.5%, 77.5%, and 21% of the 200 cases were pneumonia, varying in severity from extremely mild to severe. 12.51% of the study's participants had pneumonia, of which 82.69% had severe pneumonia and 4.8% had extremely severe pneumonia. 7 48.2% of people had pneumonia, 19.6% had severe pneumonia, and 8.8% had very severe pneumonia, according to Yousif *et al* [14].

Bronchopneumonia, which made up 33.5% of the 200 cases, was the most typical clinical diagnosis, followed by WALRTI (24.5%) and bronchiolitis (21%). Croup was identified in 5% of cases, lobar pneumonia in 14%, and empyema in 2%. In a research by Reddaiah *et al*., bronchopneumonia, lobar pneumonia, and post-measles bronchopneumonia were all diagnosed in 64%, 6.4%, and 4.0% of cases, respectively [15].

In the current study, 89.5% of patients received IV fluids, while 84.5% received nebulization. 8% required transfusions of blood or blood components. 56.5% of cases required the use of oxygen, 10.5% required CPAP therapy, and 4.5% required mechanical ventilation.

The most common complication, sepsis, occurred in 6% of cases, and empyema, in 4%. 3 out of the 9 people who needed mechanical ventilation had complex VAP. Two people suffered meningitis, and one had a pneumothorax. 1% of decortications and 4.5% of ICD insertions required. 28.5% of patients required an antibiotic change.

According to Duke *et al*, 11% of patients required a change in antibiotics [16].

44.5% required more than 7 days in the hospital. Pneumonia, severe pneumonia, and very severe pneumonia have respective mean stays of 5, 7, 4, and 10.3 days. 92% of patients improved, while 3% were discharged against counsel. Our study had a mortality rate of 3%, or 6 cases, of which 4 died from sepsis and 2 from congestive heart failure. Mishra *et al*. reported that 7.7% of patients with very severe pneumonia died [13] In comparison to extremely severe pneumonia, which required a hospital stay of 9.35 days, severe pneumonia required a much shorter hospital stay of 4.21 days. 10.45% was the case fatality rate reported by Sehgal *et al* [11].

Conclusion

One of the leading causes of morbidity and mortality in children, acute lower respiratory tract infection (also known as pneumonia), is a common reason for both outpatient and inpatient medical attention. Male infants and young children are typically impacted.

Parental smoking, the length of exclusive breastfeeding, and gestational age were among the risk factors examined. The majority of patients also belonged to lower socioeconomic groups and were housed in substandard conditions. Most of the cases were anaemic and underweight, and up to one-fourth of them had immunisations that weren't complete for their age.

The symptoms and indicators listed in the WHO ARI control programme are particularly good at spotting cases of ALRI. Routine haematological tests and blood cultures will not reveal anything about the severity or ailment's cause.

The length of stay and need for an antibiotic change were both substantially correlated with the severity of the pneumonia. The morbidity and mortality profile is improved

by early diagnosis and therapy. To reduce morbidity and mortality, local health workers are trained in the early diagnosis, care, and referral of unwell and at-risk children.

Young age, undernutrition, unhealthy housing, overcrowding, indoor pollution, and low socioeconomic level are still major risk factors for childhood respiratory illnesses. In order to reduce the morbidity and mortality from respiratory infections, this vicious cycle must be broken.

Utilizing under-five clinics effectively can help prevent malnutrition and anaemia, increase immunisation rates, and encourage exclusive breastfeeding, all of which can help lower the illness load. The burden of ARI can be reduced by raising living standards and teaching people about the dangers of smoking.

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