
Evaluation of Pneumonia Among Under-five Hospitalized Children – A Study in A Tertiary Level Military Hospital in Bangladesh

Islam MS¹, Sultana M², Khan T³, Das BK⁴

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ABSTRACT

Background: Pneumonia is one of the leading causes of mortality among under-five children contributing to 15% of deaths all over the world. More than 95% of all new cases of pneumonia in children less than 5 years occur in developing countries. The aim of this study is to evaluate the socio-demographic characteristics, clinical profile, laboratory parameters and management of hospitalized children presenting with pneumonia.

Methods: A descriptive cross-sectional study was conducted among 178 children aged between 02-59 months who were admitted into Paediatrics ward of Combined Military Hospital (CMH), Jashore during the period of July 2020 to December 2021 were evaluated. Data were collected by a trained physician from history, clinical examinations, laboratory findings and chest x-ray immediately after admission using a structured questionnaire with purposive sampling technique. All x-ray films were evaluated by radiologist and paediatrician independently.

Results: A total of 178 cases suffering from pneumonia were studied. Among them majority (87.08%) of children were below 36 months of age with the highest frequency of pneumonia was seen below 12 months (42.70%) age group. 112(62.92%) patients were male and 66(37.08%) patients were female with male-female ratio 1.7:1. Most of the patients were of normal birth weight (81.46%), fully immunized (84.27%), better maternal education, from nuclear family (81.46%) and were exclusive breast feed (70.22%). Fever, cough, breathing difficulty, tachypnoea and crackles were present nearly all patients with pneumonia. Chest x-ray suggestive of bronchopneumonia in most of the cases (91.01%). All patients received antibiotics, duration of hospital stay ranged from 03 to 14 days, mean stay was about 05 days. Nearly all the patients (97.52%) were recovered and discharged with advice.

Conclusion: Most of the patients with pneumonia were below 36 months of age with male predominance. Fever, cough, fast or difficult breathing were as a feature of pneumonia. Prompt administration of antibiotics to children with pneumonia significantly reduces the morbidity and mortality.

Keywords: Pneumonia, Fever, Cough, Chest indrawing, Antibiotics

1. Lt Col Munshi Sariful Islam, MD, DCH 2. Brig Gen Mahbuba Sultana, FCPS, DCH 3. Lt Col Towhida Khan, FCPS, MCPS 4. Maj Bijoy Kumar Das, FCPS, DCH.

INTRODUCTION

Worldwide, pneumonia is the leading and single most important cause of death among under-five children in developing countries. Globally, pneumonia is responsible for about 19% of all under-five deaths.¹ The global annual incidence of pneumonia is 150 to 156 million cases, accounting for approximately 10-20 million hospitalizations.² On average, 1 in 66 children in high-income countries is affected by pneumonia per year, compared to 1 in 5 children in low- and middle-income countries.³ Various factors like age of the child, nutrition state, breast feeding practices, vaccination status, bacterial profile and associated congenital anomalies determine the severity of the pneumonia and mortality due to pneumonia.⁴

Typically, cough, pleuritic chest pain, fever, fatigue, and loss of appetite are presenting symptoms of pneumonia. Children and the elderly with pneumonia have varying presenting features, which include headache, nausea, abdominal pain, and absence of one or more of the prototypical symptoms.⁵⁻⁶ WHO experts panel redefined the classification of pneumonia severity as ‘pneumonia’ with fast breathing and/or chest indrawing and ‘severe pneumonia’- pneumonia with any general danger signs.⁷ The diagnosis of pneumonia is based mainly on clinical parameters including respiratory symptoms and signs. The WHO recommends chest x-ray for all patients clinically diagnosed with severe pneumonia at tertiary centers.⁸

Over the last 20 years, there has been a substantial decrease in the incidence of childhood pneumonia and pneumonia-associated mortality.⁹ Childhood pneumonia can also lead to significant morbidity and chronic disease. Early life pneumonia can

impair long term lung health by decreasing lung function.¹⁰ Severe or recurrent pneumonia can have a worse effect on lung function; increasing evidence suggests that chronic obstructive pulmonary disease might be related to early childhood pneumonia.¹¹⁻¹²

This study aimed to provide socio-demographic characteristics, clinical profile, laboratory parameters, hospital management and outcome of patients with pneumonia in our setting and to emphasize early identification which will enable the physician for appropriate counselling and management while avoiding unnecessary therapeutic interventions.

MATERIALS AND METHODS

It was a descriptive cross sectional study, a total 178 children aged between 02-59 months who were admitted into CMH, Jashore (500 bedded hospital having 45 Paediatric beds including PICU & NICU) during the period of July 2020 to December 2021 with radiologically diagnosed pneumonia were evaluated. Children age below 02 months and more than 59 months & those suffering from cystic fibrosis, tuberculosis, congenital heart disease or any congenital malformation of lungs were excluded from the study. Nutritional status of subjects was assessed with reference to WHO growth charts. CBC, CRP and chest x-ray were performed on all children immediately after admission. Other investigations performed considering the history and clinical profile of individual patients were RT-PCR for COVID-19, CT scan of chest. Data were collected by using a structured questionnaire with non-probability sampling technique.. All x-ray films were evaluated by radiologist and pediatrician independently. A written informed parental consent was obtained for each patient in this study. Data were compiled, tabulated and analyzed in percentage and proportion using SPSS version 26.0.

RESULTS

In the present study, 178 children having pneumonia were evaluated.

Table-I: Age distribution of the study children (n= 178)

Age group (months)	Male	Female	Total n(%)
2–12	45	31	76(42.70)
12–24	34	18	52(29.21)
24–36	17	10	27(15.17)
36–48	09	04	13(7.30)
48–59	07	03	10(5.62)
Total	112	66	178(100)

Table-I shows out of 178 children the highest number of children 76(42.70%) suffering from pneumonia were between 2-12 months of age and the lowest number 10(5.62%) were between 48-59 months of age.

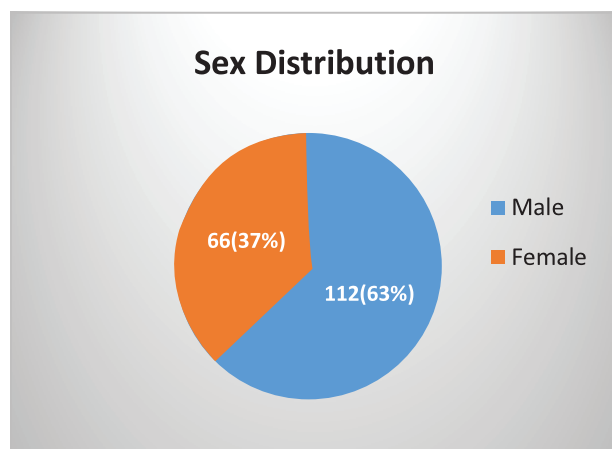


Fig-1: Sex distribution of the study children (n=178)

Figure-1 reveals that among 178 patients, 112(62.92%) were male and 66(37.08%) were female. Male-female ratio were 1.7:1.

Table-II: Distribution of children based on socio-demographic characteristics (n=178)

Patients characteristics		Frequency	Percent
Birth weight	Normal birth weight(>2500 g)	145	81.46
	Low birth weight(<2500 g)	33	18.54
Breast feeding	Exclusive breast feed	125	70.22
	Not Exclusive breast feed	53	29.78
Immunization	Fully immunized	150	84.27
	Partially immunized	28	15.73
Malnutrition (WAZ)	Moderate underweight	32	17.98
	Severe underweight	05	02.81
Resident	Urban	114	64.04
	Rural	64	35.96
Maternal education	Primary level	12	6.74
	Secondary level	54	30.34
	Higher secondary level	65	36.52
	Graduation & above level	47	26.40
Type of Family	Nuclear family	145	81.46
	Joint Family	33	18.54

The above table II shows that among the study children most of the patients were having normal birth weight (81.46%), fully immunized (84.27%), having better maternal education and from nuclear family (81.46%). More than two thirds (70.22%) were exclusive breast feed, 64.04% from urban area and 20.79% having various degree of malnutrition.

Table-III: Distribution of children according to severity of Pneumonia as per revised WHO Classification (n=178)

Category	Characteristics	Frequency	Percent
Pneumonia	Fast breathing and/ or chest indrawing	123	69.10
Severe Pneumonia	Pneumonia with any danger signs	55	30.90
Total		178	100

The above table III shows according to revised WHO classification of pneumonia were 123(69.10%) cases and severe pneumonia were 55(30.90%) cases.

Table-IV: Presenting symptoms/signs of children with pneumonia on admission (n=178)

Symptoms	Frequency	Percent
Fever	178	100
Cough	172	96.63
Breathing difficulty	170	95.51
Chest pain	50	28.09
Feeding difficulty	95	53.37
Absence of social smile	56	31.46
Vomiting	59	33.15
Cyanosis	18	10.11
Tachypnea	173	97.19
Chest indrawing	151	84.83
Crackles	163	91.57
Rhonchi	76	42.70
Consolidation	16	08.99

Table IV depicts that among the study children fever, cough, breathing difficulty, tachypnoea and crackles were present in nearly all the patients with pneumonia. The other clinical features were chest indrawing (84.83%), chest pain (28.09%), feeding difficulty (53.37%), absence of social smile (31.46%), vomiting (33.15%), rhonchi (42.70%), cyanosis (10.11%) and consolidation (8.99%).

Table-V: Investigations of the patients with Pneumonia (n= 178)

Investigations with findings		Frequency	Percent
Complete Blood Count (CBC)	Leukocytosis	97	54.49
C-Reactive Protein (CRP)	Positive	73	41.01
	Negative	105	58.99
Chest X- Ray	Bronchopneumonia	162	91.01
	Lobar pneumonia	16	08.99
RT-PCR for COVID-19	Test Positive	16	08.99
	Test Negative	162	91.01
CT scan of chest (10 cases)	COVID-19 Pneumonia	07	03.93
	Consolidation	03	01.69
Blood for culture and sensitivity (25 cases)	Positive	03	01.69
	Negative	22	12.36

Table-V shows Leukocytosis 54.49%, CRP positive 41.01%, CXR suggestive of bronchopneumonia

in 91.01%, RT-PCR for COVID-19 positive 8.99%, CT scan of chest suggestive of COVID-19 Pneumonia 3.93% patients and blood culture positive 1.69%.

Table-VI: Management of the study children (n=178)

Treatment		Frequency	Percent
Received injectable antibiotics	Yes	150	84.27
	No	28	15.73
Received intravenous fluids	Yes	25	14.04
	No	153	85.96
Received oxygen inhalation	Yes	59	33.15
	No	119	66.85
Received bronchodilators	Yes	95	53.37
	No	83	46.63
Received Chest Physiotherapy	Yes	50	28.09
	No	128	71.91

The above table VI shows that all patients received antibiotics and among them 84.27% patients received injectable antibiotics, about one third (33.15%) received oxygen and few patients (14.04%) received intravenous fluids during hospital stay.

Table-VII: Duration of hospital stay and outcome of the study children (n=178)

		Frequency	Percent
Duration of hospital stay	≤07 days	111	62.36
	≥07 days	67	37.64
Outcome of treatment	Cured	174	97.52
	Referred	03	01.69
	Death	01	0.56

Table-VII shows duration of hospital stay ranged from 03 to 14 days mean stay was about 05 days. Among all the cases, nearly two third (62.36%) patients stayed ≤ 07 days and more than one third (37.64%) patients stayed ≥07 days. Nearly all patients (97.52%) were recovered and discharged with advice.

DISCUSSION

In this study 155(87.08%) children were below 36 months of age with the highest frequency of

pneumonia was seen below 12 months (42.70%) age group. 112(62.92%) patients were male and 66(37.08%) patients were female with male-female ratio 1.7:1. Banstola et al. in their study showed majority of children admitted for treatment of pneumonia were males (60%), from upper class ethnic groups, and common among those aged 29 days to one year (49.1% of overall pneumonia cases) where the male female ratio was 1.5:1.¹³ A study conducted on children suffering from pneumonia in Dhaka Shishu (children) Hospital showed male and female ratio as 2:1.¹⁴ In another study 59.0% (475) were male and 41.0% (325) were females. The male female ratio was 1.4:1.¹⁵ Divyarani et al. in their study reported a higher incidence of pneumonia in males (62.6%) than in females (37.4%).¹⁶ Present study finding is consistent with the above studies.

In the current study most of the patients were normal birth weight (81.46%), fully immunized (84.27%), better maternal education and from nuclear family (81.46%). More than two third (70.22%) were exclusive breast feed, 64.04% from urban area and 20.79% having various degree of malnutrition. Gothankar et al. in their study showed prevalence of exclusively breast feeding till six months of age was found to be 46%, out of 639 the overall percentage of fully immunized children was 605(94.6%), by weight for height parameters, 28% of children were wasted, the percentage of a joint family in the study reports figures of 46%.¹⁷ Ekure et al. in their study showed the majority (90.6%) of the participants had secondary or post-secondary school education.¹⁸ One study in India reports the prevalence of ARI to be 59.1% but contrarily it was higher in urban areas (63.7%) than rural areas (53.7%).¹⁹ Some of the above findings correspond with present study.

In this study according to revised WHO classification pneumonia were 123(69.10%) cases and severe pneumonia were 55(30.90%) cases. Madhusudhan et al. in their study showed out of 110 total subjects, 63(57.27%) cases belonged to the revised WHO classification of 'pneumonia' and 47(42.72%) cases had 'severe pneumonia'.⁷ Present study findings doesn't match with the above study.

In the present study fever, cough, breathing difficulty, tachypnoea and crackles were present in nearly all the patients with pneumonia. The other clinical features were chest indrawing (84.83%), chest pain (28.09%), feeding difficulty (53.37%), absence of social smile (31.46%), vomiting (33.15%), rhonchi (42.70%), and cyanosis (10.11%). Shampa et al. in their study showed fever, cough, respiratory distress and chest indrawing were present in 100% patients of pneumonia group. On the other hand, respiratory distress and wheeze were present in 100% patients of bronchiolitis group.²⁰ Juven et al. in their study showed most common symptoms were fever in 96%, cough in 76%, rhinorrhea in 48%, dyspnea in 37% and malaise/lethargy in 31% of the patients. Breath rate was >40/min in 51% and >50/min in 30% of the patients. 24% of the patients had typical pneumonic rales/crackles on auscultation. Decreased breathing sounds were found in 15% of patients, wheezing in 20% and rhonchi in 33% of the patients, normal in 28% of the patients.²¹ The current study findings are almost similar with the above studies.

This study revealed leukocytosis 54.49%, CRP positive 41.01%, chest x-ray suggestive of bronchopneumonia in 91.01% and lobar pneumonia in 8.99%, RT-PCR for COVID-19 positive 8.99% and CT scan of chest suggestive of COVID-19 Pneumonia 3.93% patients. Many studies use CXRs as the gold

standard in the diagnosis of pneumonia.²² Laboratory tests (e.g., C-reactive protein, peripheral blood white cell count, erythrocyte sedimentation rate) are ancillary and non-diagnostic tests.

In the current study, regarding management of pneumonia shows all patients received antibiotics and among them 84.27% received injectable antibiotics, about one third (33.15%) received oxygen and few patients (14.04%) received intravenous fluids during hospital stay. The duration of hospital stay ranged from 03 to 14 days, mean stay was about 05 days. Among all the cases, nearly two third (62.36%) patients stayed ≤ 07 days and more than one third (37.64%) patients stayed ≥ 07 days. Nearly all patients (97.52%) were recovered and discharged with advice. Benet, et al in their study showed 99.3% patients were given antibiotics during hospitalization for a median duration of 7 days and 3.5% patients died during hospital stay.²³ Another study conducted by Hassen et al. showed the median length of hospitalization was 3 days. The majority 118(96.7%) were discharged home, whereas 3(2.5%) absconded against medical advice and 1(0.8%) died.⁸ Nguyen et al. in their study showed that the inpatient death rate was low (0.4% of admission) with most deaths occurring in the “severe pneumonia” group. Children were hospitalized for a median of 7 days.²⁴ Present study finding is consistent with the above studies.

CONCLUSION

Public campaigns on pneumonia should focus on raising awareness about the causes, symptoms and signs of pneumonia. Prompt administration of antibiotics to children with pneumonia significantly reduces the morbidity and mortality. However this requires early identification and effective interventions need to be more widely available for such children in the community.

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