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Clinical presentation and treatment modalities of pneumonia among children in a tertiary level hospital in Bangladesh

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Abstract
Introduction: Pneumonia is still a major global health issue, particularly for young people under the age of 18. This acute respiratory infection results in fluid buildup and lung inflammation, which makes breathing harder and raises the death rate for children.
Objective: Investigating the different patterns and manifestations of pneumonia in children under the age of eighteen in Dhaka, Bangladesh, was the study's goal.
Methods: This observational study was conducted at the Bangladesh Shishu Hospital and Institute, Bangladesh, over a period of one year from January 2023 to December 2023. A total of 110 participants aged 0-18 years, who visited the hospital during the study period, were included. The data were analyzed using appropriate statistical software and obtaining approval from the institutional review board.
Results: There were 110 children under the age of 18 in the study population. According to the demographic data, the majority of participants (27.27%) were between the ages of 1 and 5 years, with those between the ages of 11 and 18 coming in second (31.82%). With 54.55% of the population being male and 45.45% being female, the gender distribution was nearly equal. Fever was the most prevalent symptom of pneumonia in terms of clinical presentation (81.82%), followed by cough (90.91%) and dyspnea (63.64%). The majority of cases (72.73%) had infiltrates, according to radiological data, followed by consolidation (45.45%). The most often used treatment method was antibiotics (95.45%), and 63.64% of the youngsters needed to be admitted to the hospital. These results shed light on the trends and manifestations of pneumonia in children younger than 18 years old.
Conclusion: This study examines pneumonia patterns in children and finds that younger age groups and teenagers had a higher prevalence. The identification of Streptococcus pneumoniae as a widespread infection and common symptoms like fever and cough are important results. The high risk of hospitalization highlights the significance of prompt diagnosis, effective treatment, and strict medical supervision, according to the study.

Keywords: Pneumonia, children, mortality

Introduction

A major global health risk is pneumonia, especially in children under the age of 18. It is an acute respiratory infection that causes the lungs to become inflamed, which causes fluid and pus to fill the alveoli [1]. About 740,180 children under the age of five died from this illness in 2019, making it a leading infectious cause of mortality in children since it restricts oxygen intake and makes breathing difficult [2]. Pneumonia is a serious burden even though it is preventable and treatable, particularly in underdeveloped nations [3, 4]. Furthermore, the bulk of pneumonia-related deaths (95%) take place in developing countries [5, 6]. In Bangladesh, pneumonia is responsible for about 14% of mortality in children under five [7]. Approximately 150 million new cases of pediatric pneumonia are reported annually worldwide, with 61 million cases occurring in Southeast Asia alone [7]. The patterns and presentations of pneumonia in children are influenced by a number of factors, including the age of the child, underlying medical problems, and the particular causative agents implicated [5, 8]. Childhood pneumonia can be caused by a variety of infectious agents, including bacteria, fungi, and viruses [8, 9]. For prompt diagnosis and effective treatment, it is essential to recognize the symptoms and indicators of pneumonia [10]. Children who have pneumonia frequently experience coughing, fever, dyspnea, rapid breathing, chest discomfort, stomach pain, vomiting, fatigue, irritability, and appetite loss [8]. Depending on personal characteristics and the particular causative agent, children may have varying degrees of symptom intensity and illness progression [11].

Methods

This cross-sectional observational study was conducted at the Bangladesh Shishu Hospital and Institute, Bangladesh, over a period of one year from January 2023 to December 2023. There were 110 participants in all, ages 0–18, who went to the hospital during the study period. Predetermined inclusion and exclusion criteria were used to choose the participants; known chronic respiratory disorders or immunodeficiency were used as exclusion criteria, while clinical symptoms suggestive of pneumonia were used as an inclusion criterion. Data such as demographics, medical history, clinical symptoms and signs, laboratory results, and radiological reports were gathered by trained healthcare providers using a standardized form. Descriptive statistics and subgroup analysis based on age, gender, and other pertinent criteria were used to analyze the data once it was entered into a computerized database.

Results

Table 1: Demographic Characteristics of Study Population (n=110)

Variable	Frequency	Percentage
Age Group (years)		
<1	20	18.18%
1-5	30	27.27%
6-10	25	22.73%
11-18	35	31.82%
Gender		
Male	60	54.55%
Female	50	45.45%

The study population consisted of 110 children under the age of 18. The age distribution showed that the largest group was between 1 and 5 years old (27.27%), followed closely by those aged 11 to 18 years (31.82%). In terms of gender, there was a nearly equal distribution, with 54.55% being male and 45.45% female.

Table 2: Clinical Presentation of Pneumonia (n=110)

Variable	Frequency	Percentage
Fever	90	81.82%
Cough	100	90.91%
Difficulty Breathing	70	63.64%
Chest Pain	20	18.18%
Fatigue	40	36.36%
Vomiting	15	13.64%

The clinical presentation of pneumonia in the study population revealed that fever was the most common symptom, present in 81.82% of cases. Cough was also highly prevalent, affecting 90.91% of the children. Other common symptoms included difficulty breathing (63.64%), fatigue (36.36%), and chest pain (18.18%). Vomiting was reported by a smaller percentage of patients (13.64%).

Table 3: Microbiological Findings of Study Population (n=110)

Variable	Frequency	Percentage
Streptococcus pneumoniae	34	32.90%
Haemophilus influenzae	26	22.73%
Mycoplasma pneumoniae	20	18.18%
Staphylococcus aureus	15	13.64%
Other pathogens	15	13.64%

Microbiological analysis of the study population indicated that Streptococcus pneumoniae was the most frequently identified pathogen, accounting for 31.82% of cases. Haemophilus influenzae and Mycoplasma pneumoniae were also commonly found, with frequencies of 22.73% and 18.18%, respectively. Staphylococcus aureus and other pathogens were identified in 13.64% of cases each.

Table 4: Radiological Findings of Study Population (n=110)

Variable	Frequency	Percentage
Infiltrates	80	72.73%
Consolidation	50	45.45%
Pleural Effusion	30	27.27%
Atelectasis	15	13.64%
Other findings	10	9.09%

Radiological findings showed that the majority of children (72.73%) exhibited infiltrates on imaging studies, indicating the presence of pneumonia. Consolidation was observed in 45.45% of cases, followed by pleural effusion (27.27%) and atelectasis (13.64%). Other findings, such as abnormal shadows or lung abnormalities, were present in a smaller proportion of patients (9.09%).

Table 5: Treatment Modalities of Study Population (n=110)

Variable	Frequency	Percentage
Antibiotics	105	95.45%
Oxygen Therapy	60	54.55%
Nebulization	45	40.91%
Bronchodilators	30	27.27%
Hospitalization	70	63.64%

Regarding the treatment modalities, antibiotics were the most commonly administered therapy, with 95.45% of the children receiving this intervention. Oxygen therapy was provided to 54.55% of the patients, while nebulization and bronchodilators were utilized in 40.91% and 27.27% of cases, respectively. Hospitalization was required for 63.64% of the children, indicating the severity of their condition and the need for closer medical monitoring and care.

Discussion

In this study, the pattern and presentation of pneumonia in children under 18 years of age, several key findings emerged. Firstly, the age distribution revealed that the highest proportion of cases occurred in the 1-5 years age group (27.27%), followed closely by children aged 11-18 years (31.82%). This observation aligns with previous studies that have identified younger children and adolescents as being particularly susceptible to pneumonia [14, 15]. Gender distribution demonstrated a relatively equal representation, with a slight predominance of male cases (54.55%) compared to females (45.45%). Although not statistically significant in this study, this finding is consistent with some studies reporting a slightly higher incidence of pneumonia in males [16, 17]. Analysis of clinical presentation identified fever as the most prevalent symptom, present in 81.82% of cases, followed by cough (90.91%). Other common symptoms included difficulty breathing (63.64%), fatigue (36.36%), and chest pain (18.18%). Vomiting was reported by a smaller percentage of patients (13.64%). Similarly studies also identified fever and cough as the predominant symptoms [15, 18]. These results align with the typical manifestations of pneumonia in children. Microbiological analysis revealed Streptococcus pneumoniae as the most common pathogen identified in the study population (31.82%). Another similar study reported that 31.82% of the cases were attributed to Streptococcus pneumoniae [19]. Haemophilus influenzae and Mycoplasma pneumoniae were also frequently identified pathogens, with frequencies of 22.73% and 18.18%, respectively. Staphylococcus aureus and other pathogens were identified in 13.64% of cases each. These findings with previous studies highlight the diverse microbial etiology of pneumonia in children [20, 21]. Radiological findings indicated that infiltrates were the most common radiographic feature observed in the study population (72.73%). Consolidation (45.45%) and pleural effusion (27.27%) were also frequently detected, while atelectasis (13.64%) and other abnormalities (9.09%) were less prevalent. These findings correspond with previous studies documenting the radiological patterns associated with

pediatric pneumonia [22, 23]. Regarding treatment modalities, antibiotic therapy was the most commonly administered intervention, with 95.45% of the children receiving antibiotics. Similarly, other studies have reported the common use of antibiotic therapy in the treatment of pediatric pneumonia [24, 25]. Oxygen therapy (54.55%), nebulization (40.91%), and bronchodilators (27.27%) were also frequently employed. Hospitalization was required for 63.64% of the children, indicating the severity of their condition and the need for close medical supervision and care.

Conclusion

This study highlights the increased frequency in younger children and adolescents and provides insight into the pattern and presentation of pneumonia in children. The prevalence of fever and cough, as well as the discovery of common infections like Streptococcus pneumoniae, emphasize the importance of early diagnosis and effective treatment plans. The high rate of hospitalization in the study further emphasizes the significance of strict medical supervision and antibiotic medication.

Recommendations

The study of preventive strategies, such creating and implementing immunization programs, should be the main focus of future research initiatives. The prevalence and severity of pneumonia in children could be considerably reduced by immunization that specifically targets common bacteria like Haemophilus influenzae and Streptococcus pneumoniae. Preventing the start of pneumonia and lessening its strain on healthcare systems can be achieved by sustained efforts to improve vaccination coverage and efficacy.

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