



Pneumonia in Pediatric Outpatients: Cause and Clinical Manifestations

Md.Abul Hashem^{1*}, Bimal Chadra Das², Gazi Golam Mostofa³, Mohammad Zahirul Islam⁴,
Kartick Chandra Halder⁵, Mohammad Khairul Alam⁶, Sohel Sarwar⁷, Yakub Ali Munshi⁸

¹Assistant Professor, Department of Paediatrics, Abdul Malek Ukil Medical College, Noakhali, Bangladesh.

Email: drabul.hashem12@gmail.com

Orcid ID: 0000-0002-9815-1549

²Associate Professor, Department of Paediatrics, Abdul Malek Ukil Medical College, Noakhali, Bangladesh.

Email: drbimalcmc28@gmail.com

Orcid ID: 0000-0001-9020-8056

³Assistant Professor, Department of Paediatrics, Abdul Malek Ukil Medical College, Noakhali, Bangladesh.

Email: mostofagazi941@gmail.com

Orcid ID: 0000-0003-4626-2746

⁴Assistant Professor, Department of Paediatrics, Abdul Malek Ukil Medical College, Noakhali, Bangladesh.

Email: zahirdhaka@yahoo.com

Orcid ID: 0000-0002-0435-3239

⁵Assistant Professor, Department of Cardiology, Bangabandhu Sheikh Mujib Medical College, Faridpur, Bangladesh.

Email: hkartick2020@gmail.com

Orcid ID: 0000-0002-7223-9534

⁶Assistant Professor, Department of Paediatrics, Abdul Malek Ukil Medical College, Noakhali, Bangladesh.

Email: khairulalam6504@gmail.com

Orcid ID: 0000-0002-7570-1106

⁷Registrar, Department of Paediatrics, 250 bedded General hospital, Noakhali, Bangladesh.

Email: sohelsarwar133@gmail.com

Orcid ID: 0000-0003-2373-3373

⁸Junior Consultant, Department of Paediatrics, 250 bedded General hospital, Noakhali, Bangladesh. Email: dryeakubalim@gmail.com

Orcid ID: 0000-0002-6154-3178

*Corresponding author

Abstract

Background: The majority of children with pneumonia are managed as outpatients. Pneumonia is indeed an acute respiratory illness that mostly affects the lungs. When a healthy individual breathes, the lungs are made up of little sacs called alveoli, which fill with air. Pneumonia can occur at any age, and it is much more common in children under the age of five. Pneumonia accounts for 13% of all infectious diseases in babies under the age of two. Pneumonia in newborns is characterized by poor feeding and respiratory distress, as well as tachypnea, retractions, grunting, and hypoxemia. In contrast, the majority of published material on pneumonia, particularly bacterial pneumonia, has come from hospitalized patients. This circumstance implies a lack of straightforward, accurate ways of establishing a bacterial illness diagnosis in the outpatient context. The aim of the study was to observe the possible causes and clinical manifestations of pneumonia among pediatric patients. **Material & Methods:** This cross-sectional observational study was conducted at the Department of Pediatrics, Abdul Malek Ukil Medical College, Noakhali, Bangladesh. The study duration was August 2021- July 2022. A total of 76 infants and children with WHO ARI classified pneumonia were included in the study. **Results:** Among the participants, over half [61.84%] of participants had been less than 1 year of age, and 59.21% of the participants were male. All the participants presented with cough, and fever was also extremely common among the participants. 36.84% of the participants also had convulsions, while respiratory infections, headaches, and feeding problems were each present in 22.37% of the participants. 40.79% had crepitation in the lung, 42.11% had rhonchi or wheezing sounds, and 10.53% had both crepitation and rhonchi. Among the symptoms present in the participants, all 100 had a cough, 94.74% had a fever alongside cough, and 39.47% had fast breathing. Among the participants, 18.42% had respiratory rates of 41-50 per minute, 52.63% had a respiratory rate of 51-60, and 28.95% had a rate of over 60 per minute. The mean heart rate was 91.69 among the participants. 71.05% had grade 1 protein-energy malnutrition, 53.95% were breastfed, 38.16% were bottle-fed, and 7.89% had discontinued feeding. Poor sanitation was observed in 44.74%. 14.47% had LPG cooking gas being used in their home, while 85.53% had used non-LPG gas. **Conclusion:** The study showed that the majority of the children were under 1 year of age, and male prevalence was observed among participants. Cough and fever were extremely common clinical presentations and symptoms of pneumonia, and rhonchi and crepitation



Received: 10 August 2022
Revised: 09 September 2022
Accepted: 21 September 2022
Published: 22 October 2022

were common signs of symptoms. Grade 1 protein malnutrition, unsanitary living space, and use of non-LPG gas might have a hand in the incidence of pneumonia among the participants. Among the different types of pneumonia, bacterial and viral were the most prevalent among children.

Keywords:- Pneumonia, Rhonchi, Respiratory, Viral, Bacterial.

INTRODUCTION

Pneumonia is a prominent cause of illness and death in children under the age of five worldwide.^[1] Although the bulk of pediatric pneumonia deaths occurs in the poor world, the illness burden is enormous, and there are large healthcare-related expenses associated with pneumonia in the industrialized world.^[2] The etiology of pneumonia in children can be divided into age-specific vs pathogen-specific organisms.^[3] Viruses are the most common cause of pneumonia in older babies and toddlers aged 30 days to 2 years.^[4] Respiratory viruses are also the most frequent in children aged 2 to 5 years.^[5,6] Adolescents are often exposed to the same infectious hazards as adults. Tuberculosis (TB) should be considered in immigrants from high-prevalence areas, as well as youngsters with known exposures. Children with chronic disorders are also vulnerable to some infections. Every year, an estimated 120 million cases of pneumonia are reported globally, resulting in up to 1.3 million fatalities.^[3] In the poor world, children under the age of two account for over 80% of pediatric mortality due to pneumonia.^[7] Although the prognosis of pneumonia is improved in the industrialized world, with fewer lives lost, the illness burden is severe, with around 2.5 million cases reported each year. A third to half of these instances result in hospitalization.^[8] Pneumonia

is an infection of the lower respiratory tract, below the larynx, caused by pathogens inhalation, aspiration, invasion of the respiratory epithelium, or hematogenous dissemination.^[9] Anatomical features (nasal hairs, turbinates, epiglottis, cilia), as well as humoral and cellular immunity, serve as barriers to infection.^[9] Once these barriers are crossed, infection occurs by either fomite/droplet dissemination (mainly viruses) or nasopharyngeal colonization (primarily bacteria), resulting in inflammation and damage or death of the surrounding epithelium and alveoli. The majority of children with pneumonia are treated as outpatients.^[10] In contrast, the majority of published material on pneumonia, particularly bacterial pneumonia, comes from hospitalized patients. This predicament reflects the absence of easy, accurate tools for establishing a bacterial illness diagnosis in the outpatient context. In many situations, the symptoms of pneumonia are vague, such as a cough, fever, tachypnea, and trouble breathing.^[11] Young children may complain of stomach aches. The duration of symptoms, exposures, travel, ill contacts, baseline health of the kid, chronic diseases, recurrent symptoms, choking, vaccination history, maternal health, or birth difficulties in neonates is all-important together.^[12] The goal of this research was to identify the origin and

clinical symptoms of radiographic pneumonia in a pediatric outpatient population.

Objective

General Objective

- To observe the possible causes of pneumonia among pediatric outpatients
- To observe the clinical manifestations of pneumonia among pediatric outpatients.

MATERIAL AND METHODS

This cross-sectional observational study was conducted at the Department of Pediatrics, Abdul Malek Ukil Medical College, Noakhali, Bangladesh. The study duration was August 2021- July 2022. During this period, a total of 76 patients who had visited the outpatient department of the hospital with symptoms of cough and fever along with other clinical presentations of pneumonia had been selected for the purpose of the study following the inclusion and exclusion criteria. Prior to the commencement of data collection, informed consent was obtained from the legal guardians of the patients, and their confidentiality and ability to withdraw from the study were assured. Ethical approval was also obtained from the ethical review committee of the study hospital. Data was collected through a face-to-face interview with the guardians and recorded in a premade data sheet. All collected data were then analyzed using the SPSS version 25 software.

Inclusion Criteria

- Patients under the age of 5 years
- Patients visiting the outpatient department for treatment

- Patients whose guardians had given consent to participate in the study.

Exclusion Criteria

- Chronically ill patients
- Unwilling to participants in the study
- Patients not having pneumonia according to the WHO ARI control program despite showing symptoms
- Exclude those affected with other chronic diseases etc.

RESULTS

Among the participants, over half [61.84%] of the participants had been less than 1 year of age, while 26.32% were between the age of 1-2 years. Very few participants were over 4 years of age. 59.21% of the participants were male, while 40.79% were female. All the participants presented with cough, and fever was also extremely common among the participants. 36.84% of the participants also had convulsions, while respiratory infections, headaches, and feeding problems were each present in 22.37% of the participants.

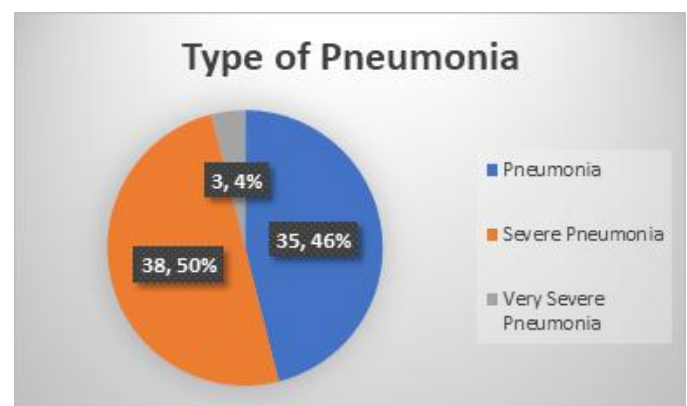


Figure 1: Distribution of the participants by type of pneumonia (n=76)

Among the participants, 46% had pneumonia, 50% had severe pneumonia, and the remaining 3 patients had very severe pneumonia.

Table 1: Baseline characteristics of the participants (n=76)

Characteristics	n	%
Age		
<1 year	47	61.84%
1-2 years	20	26.32%
3-4 years	7	9.21%
>4 years	2	2.63%
Gender		
Male	45	59.21%
Female	31	40.79%
Primary Complains		
Cough	100	100.0%
Fever	72	94.74%
Convulsions	28	36.84%
Respiratory Infection	17	22.37%
Headache	17	22.37%
Feeding	17	22.37%

Table 2: Distribution of participants by signs and symptoms of pneumonia (n=76)

Signs of pneumonia		n	%
Signs	Chest retractions	5	6.58%
	Crepitation's	31	40.79%
	Rhonchi	32	42.11%
	Crepitation And Rhonchi	8	10.53%
	Abnormal breath sounds	1	1.32%
Symptoms	Fever	72	94.74%
	Cough	100	100.00%
	Fast Breathing	30	39.47%
	Convulsions	1	1.32%
	Refusal of feeds	28	36.84%

Among the participants of the present study, signs and symptoms of pneumonia were separately recorded. Among the signs, 40.79% had crepitation in the lung, 42.11% had rhonchi or wheezing sounds, 10.53% had both crepitation and rhonchi, 6.58% had chest retractions, and 1 patient had abnormal breathing sounds other than rhonchi.

Among the symptoms present in the participants, all 100 had a cough, 94.74% had fever alongside cough, 39.47% had fast breathing, 36.84% had been refusing to eat, and 1 had convulsion as a symptom of pneumonia.

Table 3: Distribution of participants by respiratory and heart rate measurements (n=76)

Range	n	%
Respiratory Rate		
41-50	14	18.42%
51-60	40	52.63%
>60	22	28.95%
Heart Rate		
71-80	20	26.32%
81-90	24	31.58%
91-100	17	22.37%
101-110	11	14.47%
>110	3	3.95%
Mean ± SD	91.69 ± 12.03	

Among the participants, respiratory rate was above the normal range (30-50) for many of the participants, with 18.42% having respiratory rates of 41-50 per minute, 52.63% having a respiratory rate of 51-60, and 28.95% having a rate of over 60 per minute. The mean heart rate was 91.69 among the participants, with many having heart rates below the normal range, 26.32% having 71-80 bps, 31.58% having 81-90 bps, and 22.37% having 91-100 bps.

Table 4: Distribution of participants by possible associated factors

Associated Factors	n	%
Protein Energy Malnutrition		
Grade 1	54	71.05%
Grade 2	17	22.37%
Grade 3	3	3.95%
Grade 4	1	1.32%
Normal	1	1.32%
Type of feeding		
Breastfed	41	53.95%
Bottle Fed	29	38.16%
None	6	7.89%
Sanitation		
Good	42	55.26%
Poor	34	44.74%
Cooking Gas		
LPG	11	14.47%

Non-LPG	65	85.53%
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Observing the associated factors, 71.05% had grade 1 protein-energy malnutrition, 22.37% had grade 2 malnutrition, 53.95% were breastfed, 38.16% were bottle-fed, and 7.89% had discontinued feeding. Poor sanitation was observed in 44.74%. 14.47% had LPG cooking gas being used in their home, while 85.53% had used non-LPG gas.

Table 5: Distribution of participants by associated illness (n=76)

Associated Illness	n	%
Diarrhea	25	32.89%
Meningitis	16	21.05%
Septicemia	1	1.32%
None	34	44.74%

44.74% of the pediatric patients had no associated illness. However, 32.89% had diarrhea, 21.05% had meningitis and 1 patient even had septicemia as an associated illness.

Table 6: Distribution of the participants by the duration of disease (n=76)

Duration of disease	n	%
<1 week	28	36.84%
1-2 weeks	11	14.47%
>2 weeks	5	6.58%
Unknown	32	42.11%

An accurate duration of the disease was unable to be measured among 42.11% of the participants, while 36.84% had pneumonia for less than a week, 14.47% had it for 1-2 weeks and 6.58% had pneumonia for over 2 weeks.

Table 7: Distribution of the participants by diagnosis of pneumonia (n=76)

Diagnosis	n	%
Viral Pneumonia	18	23.68%
Bacterial Pneumonia	23	30.26%
Viral and Bacterial Pneumonia	30	39.47%
Mycoplasma Pneumonia	5	6.58%

Medical and histopathological diagnosis revealed that 23.68% had viral pneumonia, 30.26% had bacterial pneumonia, 6.58% had mycoplasma pneumonia, and the remaining 39.47% had both viral and bacterial pneumonia.

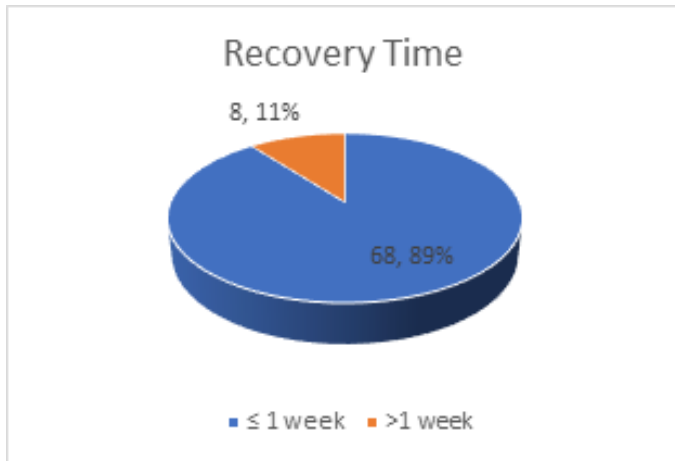


Figure 2: Distribution of the participants by recovery time (n=76)

89% of the participants took 1 week or less to recover following treatment completion, while 11% of the participants had suffered for over 1 week before starting to recover.

DISCUSSION

Pneumonia may occur at any age, although it is more frequent in children under the age of five. Pneumonia is the most common infectious infection among infants under the age of two. Pneumonia in newborns is characterized by poor feeding and irritability, as well as tachypnea, retractions, grunting, and hypoxemia. Antibiotics may be used to treat bacterial pneumonia. Most viral cases of pneumonia have no effective therapy. They frequently improve on their own. Antiviral medication may be used to treat flu-related pneumonia. By seeing the child's breathing and listening to the lungs, the health professional can typically identify pneumonia depending on the time of year and the child's symptoms. The present study was conducted to observe the most significant causes and clinical

manifestations of pneumonia in the pediatric community. Among the present study participants, only children under the age of 5 were selected. It was observed that the majority of the participants were under 1 year of age, with very few being over the age of 3. This was similar to other studies where many cases of pediatric pneumonia are focused on newborns and those under 1 year of age.^[13,14] The high male prevalence of our study was also similar to these findings. The most common presentation of pneumonia is cough, fever being the second most common one. This is as true for children as it is for the elderly.^[15,16] Headache, convulsions, and respiratory infections were also observed among the participants, while 22.37% had feeding problems. Histopathological diagnosis showed that among the 76 pneumonia cases, 50% had severe pneumonia and 4% had very severe pneumonia. The normal respiratory rate of children varies by age, ranging from 30-60 during the first year of life, and falling to 24-30 during the next 2 years. In the present study, a majority of the children were under 1 year of age. But even considering that fact, the respiratory rate was higher than normal in many of the children in the present study. A similar statement can be made regarding the infant's heart rate. Studies have observed that the respiratory rate of children can be observed and depending on how high it is from the normal range, can be used to measure the severity of pneumonia.^[17,18] Cough and fever were very common symptoms of pneumonia. Among the signs of pneumonia, crepitation and rhonchi were the most common, observed both individually and with each other in many patients. Rhonchi is a common symptom of respiratory-related illness and can be observed

in both pneumonia and asthma cases alike.^[19,20] Among the other associated factors, patient malnutrition status was recorded and observed in our study as well. It can be seen that 71.05% had grade 1 protein-energy malnutrition, 22.37% had grade 2 malnutrition, and 1 patient had no malnutrition. Proper nutrition is an important factor for any growing children, as malnutrition can make them more susceptible to many kinds of ailments. Sanitation is also an important factor for a child's gas. It was observed that 44.74% of the infants had poor sanitation. An Indian study associated non-LPG cooking gas with various ailments in children, which supports our findings where a large portion of the participants had been using non-LPG gas as their cooking fuel.^[21,22] 32.89% of the infants had diarrhea, while another 21.05% had meningitis as an associated illness. Suffering from pneumonia for a longer duration can have long-lasting effects on a child's health. Fortunately, 36.84% of the children had pneumonia for less than a week, and only 6.58% of recorded cases had pneumonia for over 2 weeks. Further diagnosis of the pneumonia cases revealed that 23.68% had viral pneumonia, 30.26% had bacterial pneumonia, 6.58% had mycoplasma pneumonia, and the

remaining 39.47% had both viral and bacterial pneumonia. Among children, bacterial and viral pneumonia both have similar prevalence, as observed in other studies.^[23,24] 89% of the participants had recovered within the first week, while 8 patients had recovered after 1 week of initial treatment.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSIONS

The study showed that the majority of the children were under 1 year of age, and male prevalence was observed among participants. Cough and fever were extremely common clinical presentations and symptoms of pneumonia, and rhonchi and crepitation were common signs of symptoms. Grade 1 protein malnutrition, unsanitary living space, and use of non-LPG gas might have a hand in the incidence of pneumonia among the participants. Among the different types of pneumonia, bacterial and viral were the most prevalent among children.

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Source of Support: Nil, Conflict of Interest: None declared