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AN OBSERVATIONAL STUDY ON PNEUMONIA IN PEDIATRICS

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ABSTRACT

Introduction

The word pneumonia had originated from the ancient Greek word "pneumon'' which means lung so the word pneumonia indicates lung disease. Disease remains a leading cause of death in children younger than 5 years of age.

Materials and methods: A prospective observational study was conducted for the period of 6 months in Sri Venkateshwara children's hospital after obtaining approval from the Institutional ethical committee.

Results: In the present study, the highest prevalence was observed in the age groups between 0-2 (64.5%) and the least prevalence was observed in age groups between 14-16 (0.5%). The highest prevalence was found in males 66% than in females 34%.

The incidence of pneumonia is more in august, 48 patients (24%). Out of 200 patient population, they are seen with different risk factors, the highest prevalence is observed in 50 (25%) patients are <6 months of age and least prevalence 2 (1%) patients are found with risk factor of Recent surgery. 20.5% (41 patients) hospitalized after their prior therapy, out of 41

patients 30(73.17%) were hospitalized due to worsening of illness, 8(19.51%) patients are due to nonadherence, and 3(7.31%) are due to wrong dose intake. LOS for 88 (44%) patients is 3 days. Out of 200 population, 101 patients (50.5%) are prescribed with corticosteroids and 99(49.5%) are without corticosteroids. The majority of effects are observed due to aminoglycosides in 24 patients (43.6%) and the incidence of vomitings (14.5%) is high due to amikacin.

Conclusion: This study demonstrates "An observational study on pneumonia in pediatrics".

Keywords: Pneumonia, pediatrics, non-adherence, corticosteroids, recent surgery, LOS (Length of stay), risk factors, aminoglycosides, amikacin

INTRODUCTION

Pediatrics is the specialty of medical science concerned with the mental, physical, and social health of children from birth to young adulthood. Pediatrics is a discipline that deals with social, biological, and environmental influences on the developing child and with the impact of disease and dysfunction on development **[1]**.

Pneumonia remains a burden in the modern world and is an important cause of morbidity and mortality in both industrialized and developing countries **[2, 3]**. The word pneumonia had originated from the ancient Greek word "pneumon'' which means lung so the word pneumonia indicates lung disease **[4]**. Disease remains a leading cause of death in children younger than 5 years of age **[5]**. Despite an increase in the global childhood population from 605 million in 2000 to 664 million in 2015, the burden of childhood pneumonia has been reduced substantially over the last decade, recent data suggest that there has been a 25% decrease in the incidence of pneumonia, from 0.29 episodes per child year in low- and middle-income countries in 2000, to 0.22 episodes per child year in 2010 **[5]**. Pneumonia is the infectious disease of the lung parenchyma and adjacent organs **[2]**. It leads to inflammation of the air sacs in the lungs, which is caused mainly by bacteria **[6]**. Pneumonia has been associated with various environmental and child-related risk factors that contribute to increasing the incidence and/or severity of the disease **[7]**. Respiratory insufficiency, acute extrapulmonary organ dysfunction due to sepsis are the important prognostic parameters **[8]**. Pneumonia can be effectively treated by antibiotics and vaccinations are also available for the prevention of this infection **[6]**. In patients with community-acquired pneumonia, Length of hospital stay (LOS) is variable and directly related to medical costs. Accurate estimation of LOS on admission and during follow-up may result in earlier

and more efficient discharge strategies **[9]**. Adverse drug reactions, one important form of adverse drug events, may rank as the fourth to sixth leading cause of death in the United States, with more than 100,000 deaths per year and understanding the factors associated with these adverse events may help in the development of prevention strategies, with resulting improving health care quality and lowering health care costs **[10]**.

Pneumonia is defined as an infection of the lung which leads to inflammation of the air sacs [alveoli] which leads to high-grade fever, cough, shortness of breath **[6]**. It can affect one (or) both lungs **[4]**. Bacteria constitute the major cause of pneumonia **[2]**.

MATERIALS AND METHODS

Study site:

A prospective observational study was conducted for the period of 6 months from July 2019 to January 2020 in Sri Venkateshwara children's hospital after obtaining approval from the Institutional ethical committee and taking a sample size of about 200 patients.

Selection of participants:

Participants for the study are selected based on the inclusion criteria.

Inclusion criteria:

Children who are diagnosed with pneumonia between the ages 1-16 years were included in the study.

Exclusion criteria:

Children of age above 16 years are excluded from the study.

Source of data:

Necessary data for the study is collected from the patient lab reports, patients' case sheets, reviewing the case records, and interviewing patients' caretakers.

RESULTS

In this study, 200 pneumonia patients were included. Out of 200 population, patients were divided into groups according to their age. The highest prevalence was observed in the age groups between 0-2(64.5%), followed by 2-4(13%), and the least prevalence was observed in age groups between 14-16(0.5%), 12-14(0.5%) **(Table 1)**.

Out of 200 population, 66% were males and 34% were females. The highest prevalence was found in males than in females **(Table 2)**.

Out of 200 population, the incidence of pneumonia is more in august 48 patients (24%), September 41 patients (20.5%), followed by October 23 patients (11.5%), November 30 patients (15%), December 23 patients (11.5%), and January 35 patients (17.5%) **(Table 3)**.

Out of 200 patient population, they are seen with different Risk factors in which 50(25%) patients are <6 months of age, 49(24.5%) are Underweight, 22(11%) patients are Passive smokers, 59(29.5%) patients are seen with Respiratory diseases,

8(4%) patients are seen with CVS disorders, 10(5%) patients are seen with CNS disorders and 2(1%) patients are found with a risk factor of Recent surgery **(Table 4)**.

Among the 200 patients with pneumonia, 20.5% (41patients) were hospitalized after their prior therapy **(Table 5)**.

Out of 41 patients (20.5%) who are hospitalized after their prior therapy, 30(73.17%)

hospitalized due to worsening of illness, 8(19.51%) patients are due to nonadherence, and 3(7.31%) are due to wrong dose intake **(Table 6)**.

Out of 200 patient population, the LOS for 53(26%) patients are 2 days, for 88(44%)

patients LOS is 3 days, for 35(18%) patients the LOS is 4 days, followed by LOS for

20(10%) patients include 5 days and LOS for 4(2%) patients is 6 days **(Table 7)**.

Out of 200 population, 101 patients (50.5%) are prescribed corticosteroids and 99(49.5%) are without corticosteroids **(Table 8)**.

Out of 200 population, the majority of effects are observed due to aminoglycosides by 24 patients (43.6%), cephalosporins by 21 patients (38%), followed by corticosteroids effects by 6 patients (10.9%), decongestants effects by 3 patients (5.4%) and antiprotozoal effects by 1 patient (1.8%) **(Table 9)**.

Out of 200 population, the incidence of diarrhea is 9.09%, vomiting's 14.5%, skin rashes 3.63%, eosinophilia 5.45%, ringing sensation in ear 5.45% and black stools 7.27%, thrombocytopenia 5.45%, abdominal pain 7.27%, swelling of lips 7.27%, sleeplessness 10.90%, constipation 5.45%, vomiting 1.81% **(Table 10)**.

Table 1: Age-wise distribution of Data

S. No.	AGE GROUP	NO OF PATIENTS	PERCENTAGE
1	0-2	129	64.5%
2	2-4	26	13%
3	4-6	23	11.5%
4	6-8	08	04%
5	8-10	07	3.5%
6	10-12	05	2.5%
7	12-14	01	0.5%
8	14-16	01	0.5%
TOTAL		200	100%

Table 2: Gender wise distribution

S. No.	GENDER	NO OF PATIENTS	PERCENTAGE
1	Males	132	66%
2	Females	68	34%
TOTAL		200	100%

Table 3: Month-wise distribution

S.NO	MONTH	NO OF PRESCRIPTIONS	PERCENTAGE
1	August	48	24%
2	September	41	20.5%
3	October	23	11.5%
4	November	30	15%
5	December	23	11.5%
6	January	35	17.5%
TOTAL		200	100%

Table 4: Risk factors

S. No.	RISK FACTORS	NO.OF PATIENTS
1	<6Months	50
2	Underweight	49
3	Passive smoking	22
4	Respiratory diseases	59
5	CVS disorders	08
6	CNS disorders	10
7	Recent surgery	02
TOTAL		200

Table 5: Hospitalization after prior therapy

TOTAL	PATIENTS HOSPITALIZED AFTER PRIOR THERAPY
200	41

Table 6: Factors influencing Hospitalization

S.No.	VARIOUS FACTORS	NO.OF PATIENTS	PERCENTAGE
1	Worsening of illness	30	73.17%
2	Non-adherence	08	19.51%
3	Wrong dose intake	03	7.31%
TOTAL		41%	100%

Table 7: Length of stay

S.NO	DURATION OF STAY	NO OF PATIENTS	PERCENTAGE
1	1 day	0	0%
2	2days	53	26%
3	3days	88	44%
4	4days	35	18%
5	5days	20	10%
6	6days	04	02%
TOTAL		200	100%

Table 8: Prescribed number of corticosteroids

S. No.	TYPE OF PRESCRIPTION	PATIENTS	PERCENTAGE
1	Prescriptions without corticosteroids	99	49.5%
2	Prescriptions with corticosteroids	101	50.5%
TOTAL		200	100%

Table 9: Drug-induced effects

S. No.	DRUG	NO OF PATIENTS	PERCENTAGE
1	Aminoglycosides	24	43.6%
2	Cephalosporins	21	38%
3	Corticosteroid	06	10.9%
4	Decongestant	03	5.4%
5	Antiprotozoal	01	1.8%
TOTAL		55	100%

Table 10: Adverse drug reactions (ADR)

S. No.	DRUG	ADR	NO OF PATIENTS	PERCENTAGE
1	Amikacin	Eosinophilia	3	5.45%
2	Amikacin	Diarrhea	4	7.27%
3	Amikacin	Vomiting	8	14.5%
4	Amikacin	Ringing sensation in ear	3	5.45%
5	Amikacin	Black stools	4	7.27%
6	Amikacin	Red patches on skin	2	3.63%
7	Cephalosporins	Abdominal pain	4	7.27%
8	Cephalosporins	Thrombocytopenia	3	5.45%
9	Cephalosporins	Diarrhea	5	9.09%
10	Cephalosporins	Swelling of lips	4	7.27%
11	Cephalosporins	Vomiting	5	9.09%
12	Corticosteroids	Sleeplessness	6	10.90%
13	Decongestants	Constipation	3	5.45%
14	Antiprotozoals	Vomiting	1	1.81%
TOTAL			55	100%

DISCUSSION

Age: According to the study conducted by David. A McAllister *et al.,* **[11]** from 2000-2015, and Krishna Kumar Yadav *et al.,* 2016 **[12]** observed the incidence of pneumonia is more below 5 years of age. In the present, study the incidence of pneumonia is more in children below 5 years of age because of low immunity.

Incidence: In our study, out of 200 patients, 66% of males and 34% were females .similarly in the study conducted by Hemagiri K *et al*., **[12],** performed over one year from 1-02-2011 to 31- 01-2012 observed the incidence of pneumonia was out of 270 cases 67.1% were males and 32.9% were females.

Month wise distribution: According to the study conducted by the Yan Lia *et al*., in 2012, **[13]**, observed that among 199 enrolled in the study the incidence of pneumonia is more in winter(41.7%) and least in summer(17.5%). In contrast, in our study, the incidence of pneumonia is more rainy season (56%) than winter (44%) because of the stability of pneumococci in air and due to pooled water in areas that help for the bacteria to survive. In August (24%), September (20.5%), followed by October (11.5%), November (15%), December (11.5%), and January (17.5%).

Risk factors: According to the study conducted by Eduardo Jorge da Fonseca Lima *et al*., between October 2010 and September 2013 **[7]** observed that among 814 patients, household crowding and not having been vaccinated against the influenza virus were the only factors found to increase the likelihood of pneumonia. In contrast, in the present study the risk factors associated with pneumonia includes <6 months of age 55%(50 patients), underweight 24.5% (49 patients), passive smoking 11%(22 patients), respiratory diseases 29.5%(59 patients), CVS disorders 4%(8 patients), CNS disorders 5%(10 patients) and recent surgery 1% (2 patients).

Hospitalization afterprior therapy: According to the study conducted by the Mohammedreza Shariatzadeh MD *et al*., 2013, **[14]**, that Seventy-five (77.3%) of the 97 patients who met the inclusion criteria had CAP, and 22 (22.7%) patients presented with a noninfectious illness. In the present study, out of 200 population, 41 patients (20.5%) were hospitalized after their prior therapy due to pneumonia.

Factors influencing hospitalization: According to the study conducted by the Mohammedreza Shariatzadeh MD *et al*., 2013, **[14]**, that Seventy-five (77.3%) of the 97 patients who met the inclusion criteria had CAP, and 22 (22.7%) patients presented with a noninfectious illness out of included patients with CAP, 25 (33.3%) met the study criteria for worsening of a comorbid illness, 2 3 (30.7%) had a clinical failure, 16 (21.3%) had a microbiological failure, six (8.0%) were noncompliant, four (5.3%) had a failure of expectations and one (1.3%) had adverse effects of antimicrobial therapy. In the present study, out of 200 population with pneumonia 20.5% population(41patients)came to the hospital after their initial therapy, out of which 73.1%(30 patients) came with worsening of illness, nonadherence 19.5%(8 patients), and 7.3%(3 patients) came due to wrong dose intake.

Length of stay: According to the study conducted by, R. Menendez *et al*., in 2003 **[16]**, observed that among 425 patients the overall mortality was 8.2% and the median length of stay (LOS) was 9 days and according to Isabelle Suter-Widmer, *et al* study in 2012 **[9]**, concluded that mean LOS in the 875 included CAP patients was 9.8 days. In contrast in the present study, the minimum stay in the hospital is three (3) days DOS in patients with community-acquired pneumonia is variable and directly related to medical costs, respiratory rate, nursing home residence, severity condition of the patient.

Prescribed No. of corticosteroids: In the present study, out of 200 children enrolled, among them, 50.5% (101) children were prescribed corticosteroids, and reduction in the symptoms and length of stay in the hospital is noticed. According to the study conducted by Prof. Youn Ho Shin *et al*., **[17]**, observed that all children (66) had received dexamethasone for two days in addition to broad-spectrum antimicrobial therapy, The mean days of dexamethasone use were 2.9 ± 1.1 days. Fifty-one children became afebrile within 24 hr, and their clinical status and radiographic findings improved, and the length of hospitalization was reduced

Drug induced effects: According to the study conducted by Robert Y. Lin, MD *et al*., in 2000-2005 observed that in the New York (SPARCS) database (NYS), 278,425 pneumonia admissions were identified. In

HCUP-NIS data subsets (NIS), 186,193 pneumonia admissions formed the cohort. In the NYS cohort, 1,329 (0.48%) had an adverse effect related to an antibiotic or anti-infective. In the NIS cohort, an estimated 0.53% had an adverse drug effect. In contrast in our study, among the 200 population,55 had (27.5%) and adverse effects.

Adverse drug reaction: According to the study conducted by Robert Y. Lin, MD *et al*., **[10]** in 2000-2005, Skin and allergy manifestations potentially associated with adverse drug effects were reported in 34% and 43% of the NIS and NYS cohorts, vomitings /nausea percentage is 6.3% and 7.4% of the NYS and NIS and diarrhea percentage is 26.5% and 25.5% of the NYS and NIS, according to the study conducted by the

R. Priyadharsini, 2009, **[18]**, in Nigeria, the two most frequently reported suspected ADRs were diarrhea (51%) and skin rashes (18%) was observed in children. In the present study, the incidence of diarrhea is 16.36% (amikacin, cephalosporins), vomitings 25.4% (amikacin, cephalosporins, anti-protozoal), skin rashes 3.63%, eosinophilia 5.45%, ringing sensation in-ear 5.45% and black stools 7.27% (amikacin), thrombocytopenia 5.45%, abdominal pain 7.27%, swelling of lips 7.27% (cephalosporins), sleeplessness 10.90% (corticosteroids), constipation by 5.45% (decongestant).

CONCLUSION

In the present study, the prevalence of pneumonia is high between 0-2 years of age and is most commonly occurs in the month of August. The prevalence of pneumonia is high in males compared to females. About 20.5% of patients were hospitalized after prior therapy and a major factor influencing hospitalization is worsening of illness. The incidence of ADRs was high for the amikacin antibiotic. The clinical pharmacist plays a vital role in educating the patient's caretakers about the disease, counseling regarding the drugs and lifestyle modifications to be followed, identifying the risk factors, creating awareness about the hygiene condition may reduce the incidence, identification of drug-induced effects and ADRs and to reduce hospital stay and severity of the disease.

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