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**AN OBSERVATIONAL COMPARISON STUDY OF CORTICOSTEROIDS  
AND BRONCHODILATORS IN PNEUMONIA AND ACUTE BRONCHITIS  
IN PEDIATRIC GROUP**

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**ABSTRACT**

**Background:** Pneumonia and acute bronchitis are the major life threatening condition in children. Especially in India, these conditions are very common and around 4 lakhs children aged below five years die every year from multiple diseases cause by acute respiratory infection.

**Purpose:** To examine the prescription behaviour of glucocorticoids and bronchodilators in pneumonia and acute bronchitis in children.

**Methods:** The approval of the human ethics committee was obtained from Aditya Bangalore Institute of Pharmacy Education and Research, Bangalore. Enrolled were the patients who met the study's eligibility requirements. The patient's demographic was entered. Data on the patient's demographics, clinical condition, and medications was gathered and entered into specially created documentation forms. Descriptive statistics were used to evaluate the obtained data.

**Results:** There were 101 children involved in the study, ranging in age from 1 year to 15 years. It includes males and females equally. Most of the prescriptions contained Bronchodilators and antibiotics. Among them, the bronchodilators group of drugs Levo salbutamol nebulizer (35.145%), in the corticosteroid group, prednisolone syrup (16.25%), and in antibiotics group,

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cephalosporins (68%) were prescribed mostly. syrup formulations containing prednisolone and inhaler formulation bronchodilators were used widely.

**Conclusion:** As a first-line choice bronchodilator Lev. salbutamol is used in treating pneumonia and acute bronchitis. The first line choice of corticosteroids is prednisolone syrup. Cephalosporins are the antibiotics that are used in a wide range for both diseases whereas all bronchodilators were given in nebulization form and corticosteroids were given in oral route. All the prescribed drugs were within the FDA-recommended dose range in children.

**Keywords:** Acute bronchitis, antibiotics, bronchodilators, corticosteroids, pneumonia

## INTRODUCTION

The study is based on the comparison study of bronchodilators and corticosteroids in acute bronchitis and pneumonia, one of the top 10 most prevalent outpatient conditions in the US is acute bronchitis, About 5 percent of American adults. Every year, during the winter, it grows more frequently. Generally, it is contingent upon the time of year, immunization history, and the existence of an epidemic. Lower respiratory tract infection (LRTI) which is inflammation and infection of the pulmonary parenchyma in one or both the lungs caused by bacterial, viral, or fungi organisms [1]. Acute As an inflammation or swelling of the air route between the nose and the lungs known as the bronchial tubes (bronchi), bronchitis is more specifically defined as an infection or inflammation of the lining of the bronchial tubes. According to WHO, 14 lakh children under the age of five years die every year because of Pneumonia, accounting for 18% of all deaths of children under five years old worldwide [2]. It was reported by 2030, the

Sustainable Development Goals (SDGs) aim to eliminate fatalities among infants and children caused by the respiratory related infections [3] but an estimated 5.5 million youngsters in this age range passed away from diseases that may have been prevented in 2017 [4]. In all ages, 55% of lower respiratory infection mortality were attributable to pneumococcal pneumonia (1.5 million deaths) [5]. The study was mainly based on the types of bronchodilators and corticosteroids used in a Paediatric Patient group, where the study mainly focused on the types of formulations used as bronchodilators, corticosteroids, antibiotics, and different classes of drugs used in pneumonia and acute bronchitis. Our study focuses mainly on identifying the different classes of drugs and the Paediatrics patients affected. To date, there are no studies available on a comparison study of bronchodilators and glucocorticoids.

### Objectives:

The objectives of the study are to examine the distribution and first line choice

of Glucocorticoids and Bronchodilators along with the assessment of antibiotics and application of different formulations of steroids used in cases of acute Bronchitis and Pneumonia among the age wise children.

#### **METHODOLOGY:**

**Duration of the study:** The study was conducted for a period of six months (June to December, 2019).

**Site of study:** The study was conducted at tertiary care hospitals (Government hospital Yelahanka and Aster CMI hospital, Hebbal, India).

**Study design:** A prospective observational study.

**Sources of data and material:** Medication and treatment schedule, appropriate design documentation form, laboratory results report, and patient profile sheet

#### **Study criteria:**

**Inclusion criteria:** Individuals who have been diagnosed with lung illnesses meet the inclusion criteria. Individuals, who have prescribed with at least one bronchodilator or steroid. Individuals who are prescribed a minimum of one antibiotic can be considered for the study.

**Exclusion criteria:** Every outpatient or special child individual and heart surgery or kidney disease children were excluded. Patients who were extremely mentally unwell were excluded. COVID-19 patients were excluded.

**Method of data collection:** The technique of gathering data involves using a specially created form.

**Procedure:** The protocol was submitted to the institutional human ethical committee, Aditya Biper Institute of Pharmacy Education and Research, Bangalore for human ethical approval (with the ethical approval Ref no: CMC/IEC/Pharm D/24092020/03, dated 24/09/2019). Patients who met the study requirements were added to the trial, and informed consent was acquired from the participants. A specially created data collecting form was used to gather the patient's clinical, demographic, and pharmaceutical data. Using standard references including the Physician Desk Reference, Micromedex, and WHO recommendations, all the data is reviewed from the perspective of glucocorticoid and bronchodilator prescribing patterns.

**Analysis of data:** Descriptive statistics were used to evaluate the obtained data.

#### **RESULTS**

In both the diseases Pneumonia and Acute bronchitis female patients are more affected. The percentage of a female patient with pneumonia and acute bronchitis was 26 children patient which was 25.74% (**Figure 1**).

Thereafter, according to the **Figure 2**, bronchopneumonia is more affected in male patients, and Bilateral (B/L) Pneumonia is

more affected in Female patients. Total number of cases was recorded for 50.

Further, age and gender wise cases on acute bronchitis and Pneumonia were recorded and depicted in **Figure 3 and 4**. The total number of cases of Acute Bronchitis and Pneumonia were recorded as 51 and 50 respectively.

In those under the age of five both pneumonia and acute bronchitis affect female patients more frequently than male patients. In the age range of 5 to 10, female patients are more likely to experience acute bronchitis; in the age range of 10 to 15, female patients are more likely to experience pneumonia; in the case of acute bronchitis, male patients are more likely to experience symptoms than female patients

1<sup>st</sup> line choice of corticosteroids is prednisolone syrup in acute bronchitis and pneumonia. Out of 101 Patients, 27.45% of female Patients suffering from acute bronchitis were prescribed syrup prednisolone whereas prednisolone syrup was prescribed to only 10% of male patients with pneumonia. Hydrocortisone injection was prescribed to a female Patient suffering from Pneumonia only 6%; Inhaler was prescribed to almost 6% of the patients suffering from acute Bronchitis and Pneumonia (**Figure 5**). Total number of cases was 101.

1<sup>st</sup> Line choice of bronchodilators is Levo salbutamol nebulizer in acute bronchitis and pneumonia. Levo salbutamol nebulizer has been used wisely as a bronchodilator in acute bronchitis and pneumonia. About 17.64% acebrophylline syrup was prescribed mostly in male Patients suffering from acute bronchitis. Overall 8% of nebulisations were prescribed for children suffering from acute bronchitis and Pneumonia (**Figure 6**). Total number of cases was 101.

Thereafter, in our study, we have observed that Doctors preferred more syrup than any other formulations. Syrup Prednisolone, Hydrocortisone Injection, Budesonide in combination with Formoterol inhaler have been used as a corticosteroid formulation (**Figure 7**). Total no of Patients was 51.

Out of 50 Patients, we have observed that syrup and injection were used more in Pneumonia Patients and the data was represented in **Figure 8**.

Furthermore, Cephalosporine antibiotics have been used more in acute bronchitis and Pneumonia. macrolides were the second choice of drug as antibiotics (**Figure 9**). Proton Pump inhibitors and Leukotriene antagonists were the most used drugs in our study (**Figure 10**). Total no of patient participated was 101.

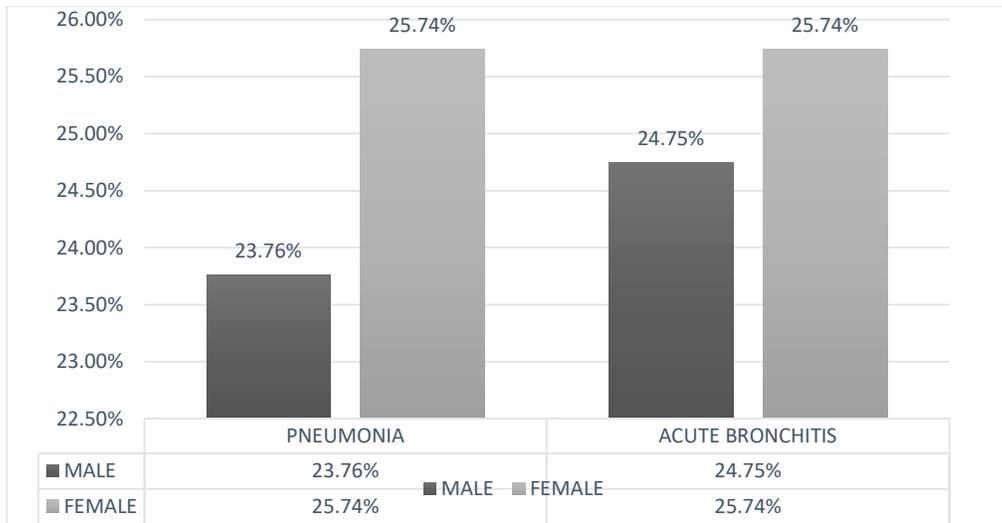


Figure 1: Gender Wise Distribution of LRTI (acute bronchitis and pneumonia)  
Total number of child patients (N = 101)

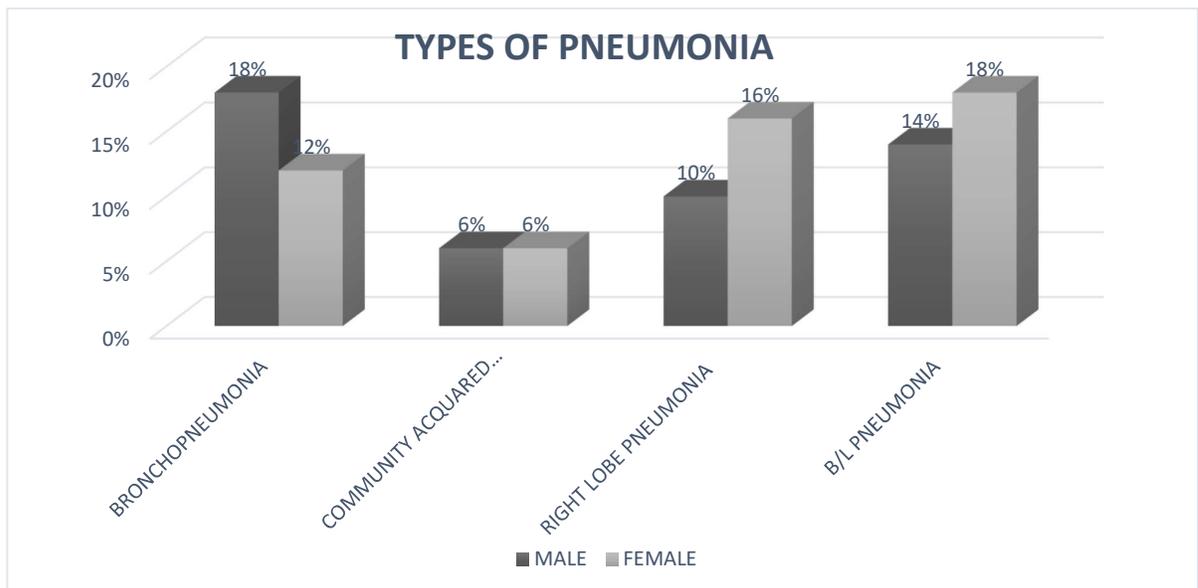


Figure 2: Gender wise distribution of different types of pneumonia

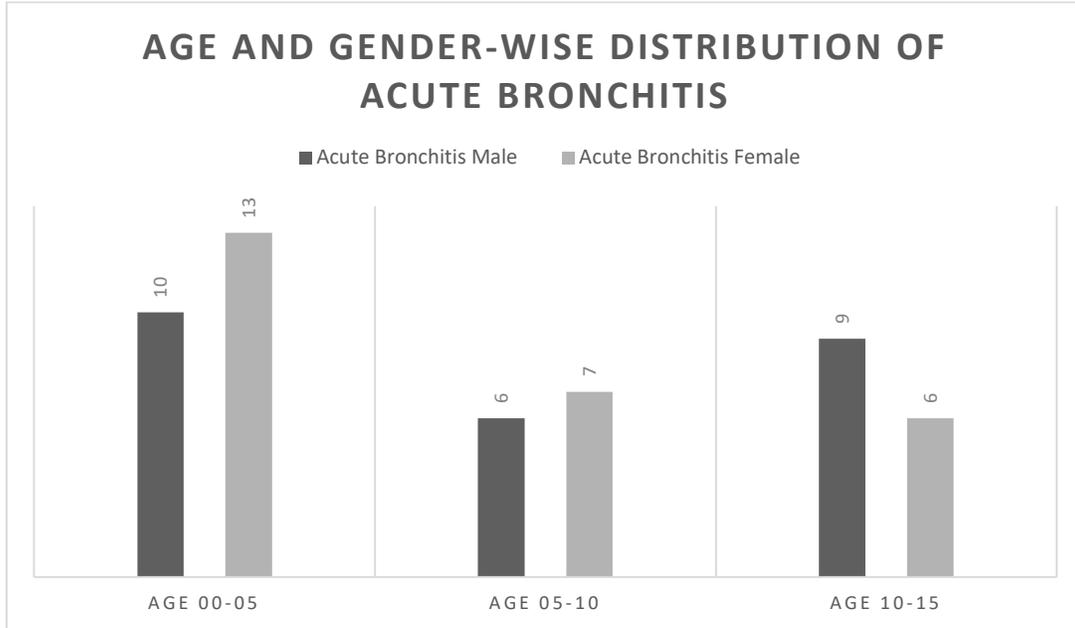


Figure 3: Age and gender-wise distribution for acute bronchitis

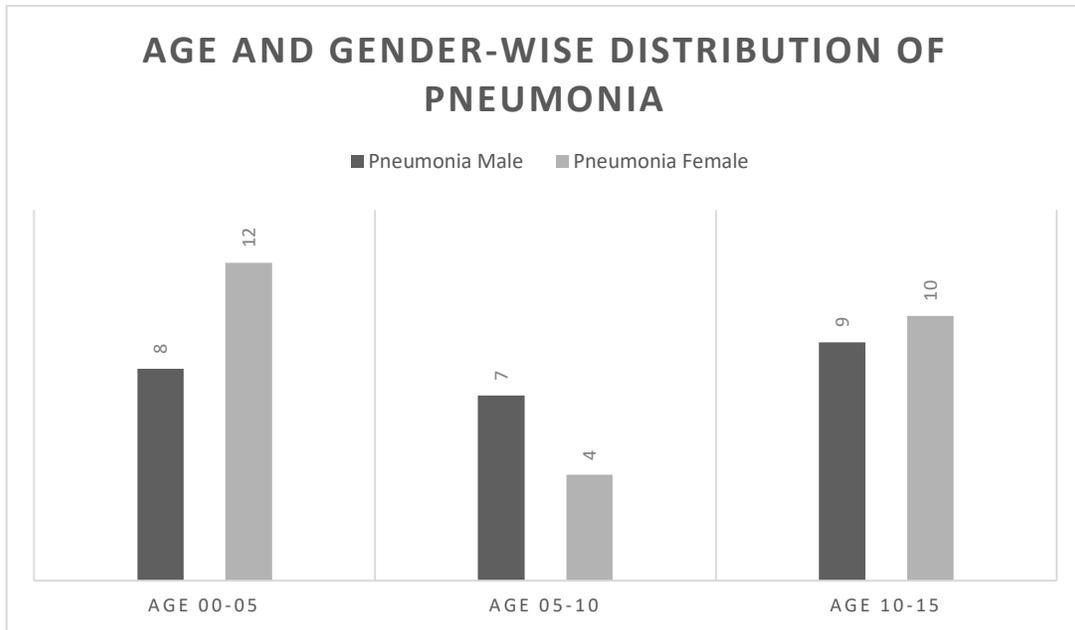


Figure 4: Age and gender-wise distribution for Pneumonia

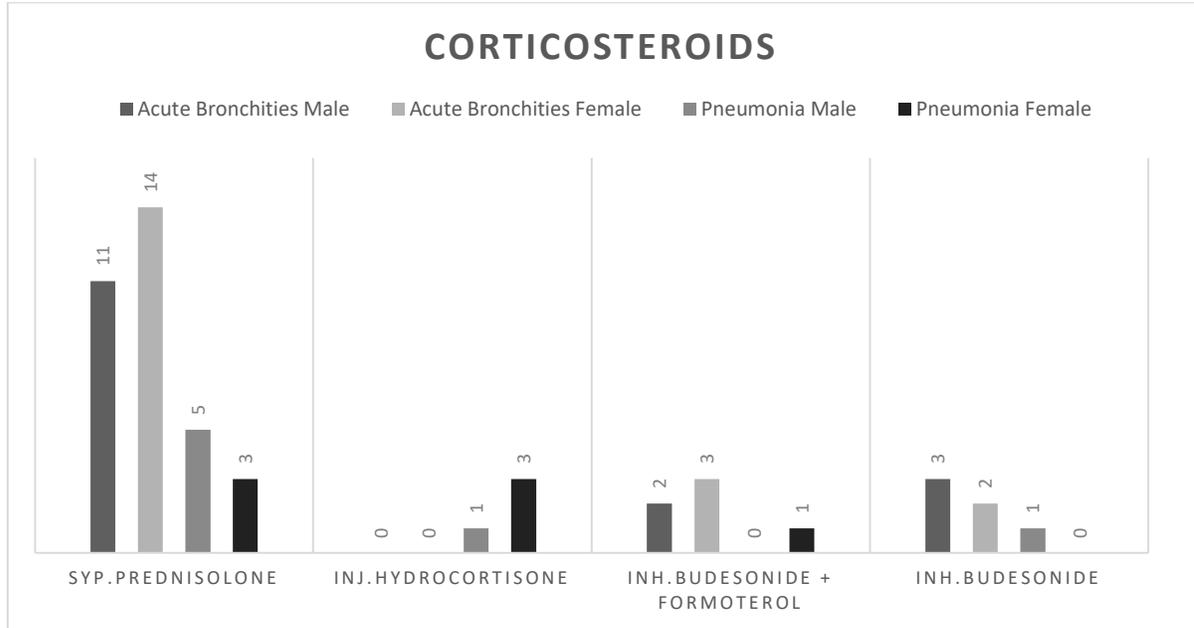


Figure 5: Choice of corticosteroids in acute bronchitis & pneumonia

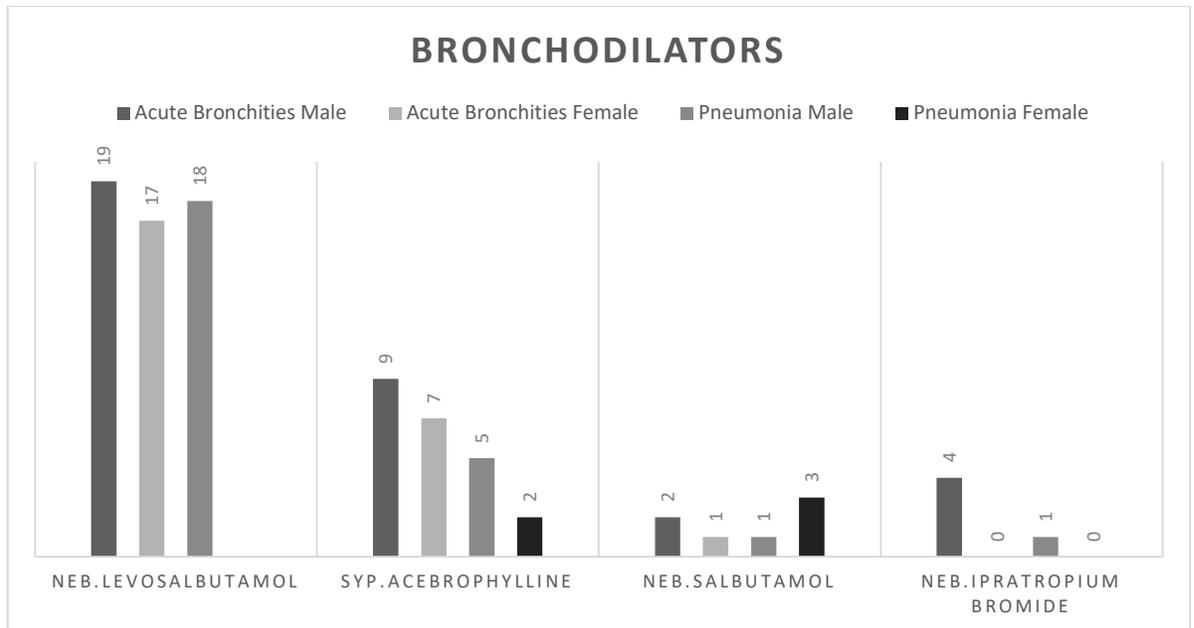


Figure 6: Choice of bronchodilators in acute bronchitis & pneumonia

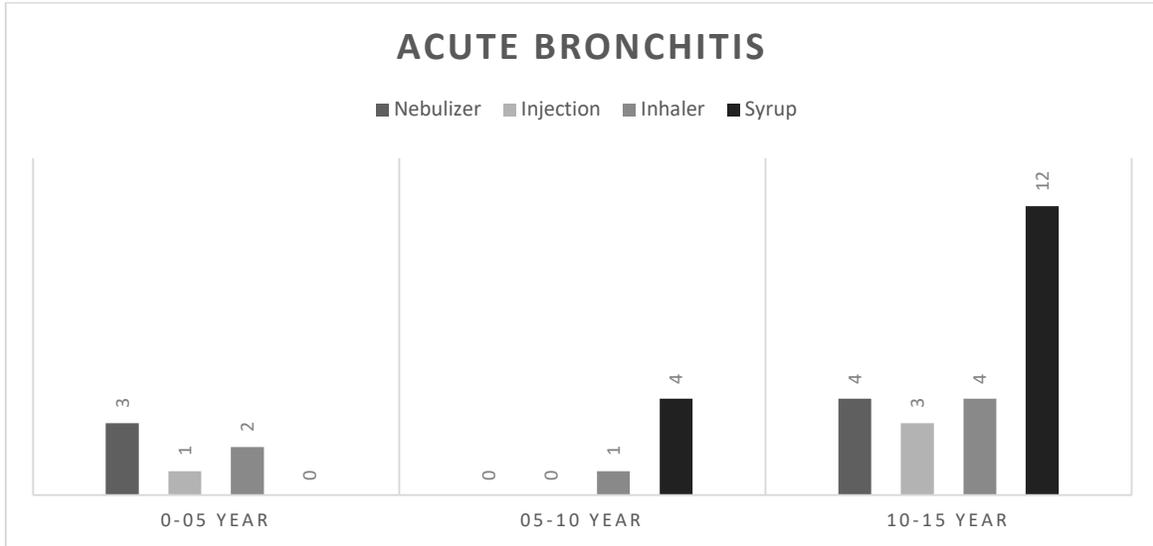


Figure 7: Age-wise distribution of steroids in acute Bronchitis

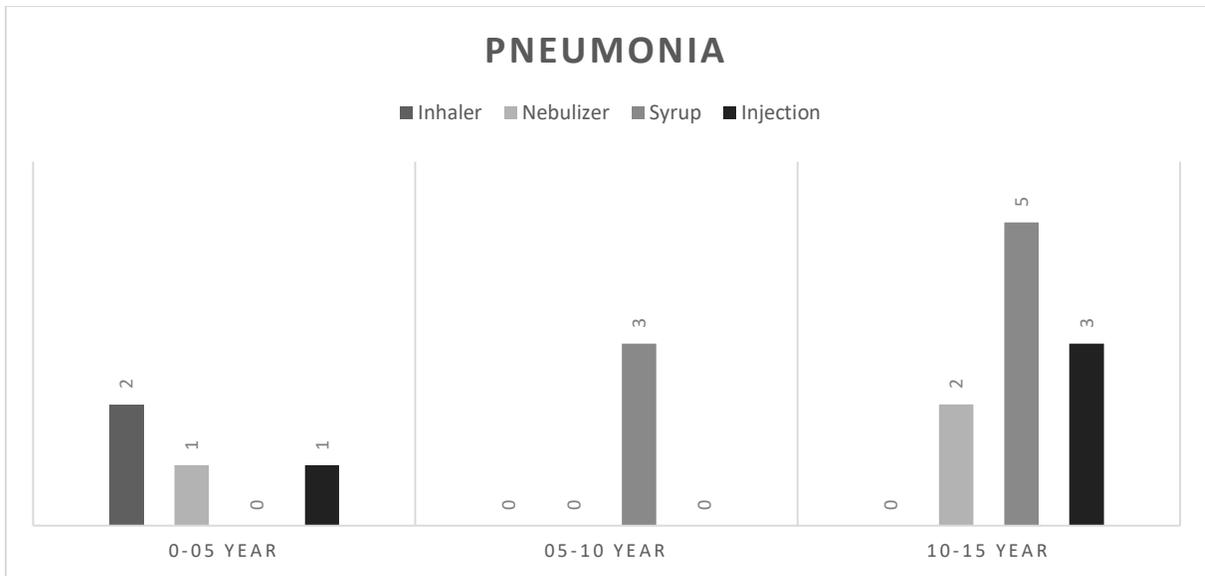


Figure 8: Age-wise distribution of steroids in Pneumonia

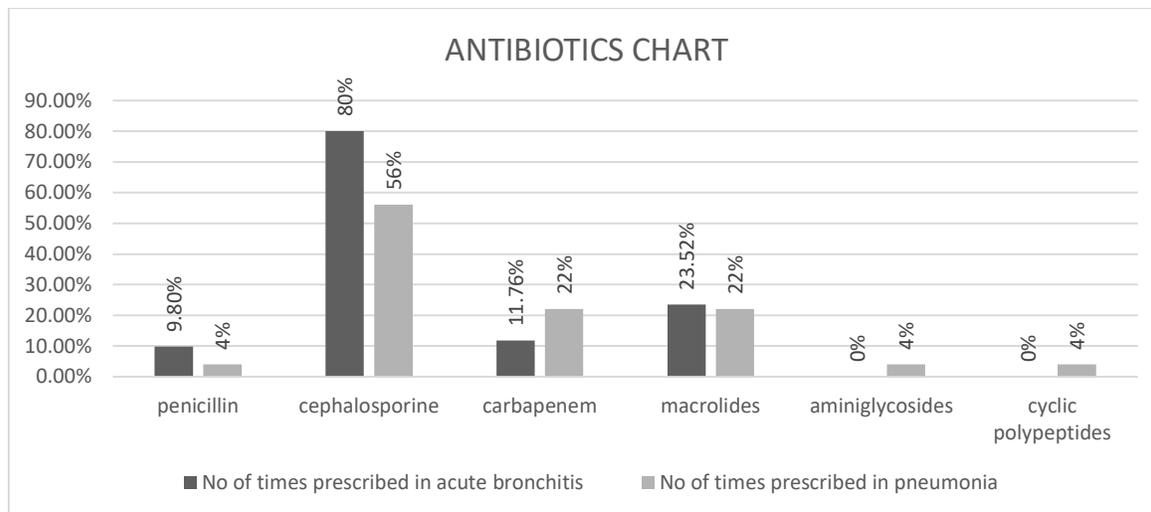


Figure 9: Different categories of antibiotics prescribed for acute bronchitis and pneumonia

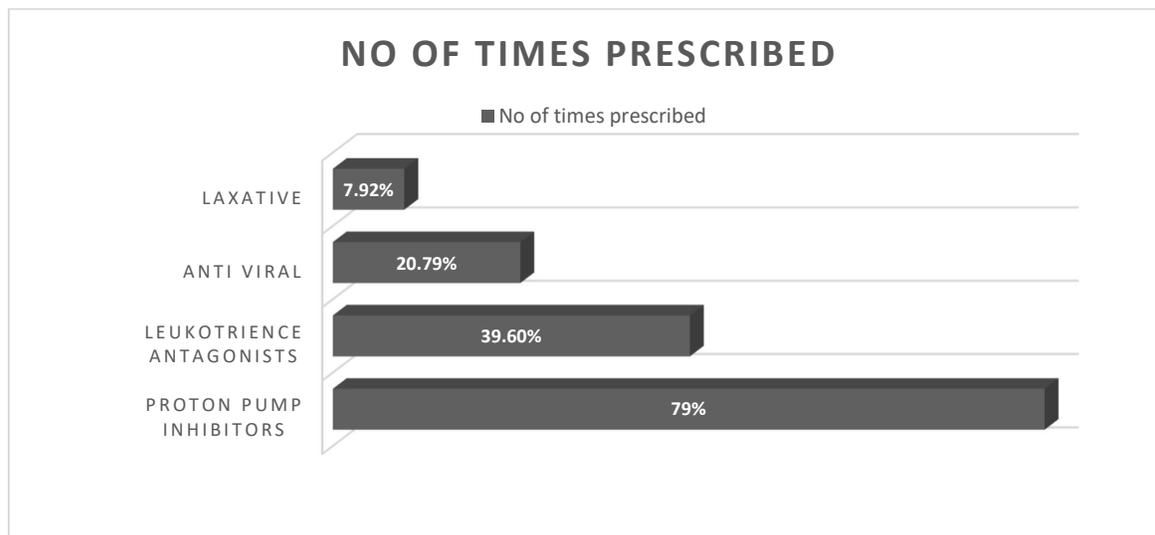


Figure 10: Different class of drugs used in bronchitis and pneumonia

**DISCUSSION:**

50 male and 51 female patients made up the study's total of 101 participants. There were two distinct types of lung illness in this investigation pneumonia and acute bronchitis, 50 pneumonia, and 51 acute bronchitis cases have been observed. It covers the paediatric group; Antibiotics, bronchodilators, interleukin antagonists,

glucocorticoids, and other medication classes are used to treat acute bronchitis and pneumonia [6, 7]. In the present study, drug prescription includes protein pump inhibitors (79%) glucocorticoids (16.25%) antiviral (20.79%) laxatives (7.92%) antibiotics (36.95%). In our current study mostly as the first-line choice of bronchodilators levo salbutamol was used

and the first-line choice of corticosteroids was prednisolone in used. In our study, we have observed that a syrup formulation of corticosteroids has been prescribed more than the inhaled or injection formulation of corticosteroids out of 51 patients with acute bronchitis 49.01% of the children were prescribed the syrup Prednisolone. In earlier report, prednisolone was used as first-line choice of corticosteroids [8]. In pneumonia, corticosteroids have been prescribed less than the acute bronchitis Patients; overall only 15%-20% of corticosteroids have been used to treat pneumonia. Inhaled corticosteroids are more preferred in bronchitis Patients than pneumonia Patients, in our study, only 2% of patients were prescribed inhaled corticosteroids suffering from pneumonia, and 3-5 % were prescribed for acute bronchitis.

Nebulizer bronchodilators were equally prescribed for Patients suffering from acute bronchitis and Pneumonia; overall 80% of the Patients were prescribed bronchodilators. ipratropium bromide was not prescribed for the female patient. Out of 101 Patients, only 5 patients were prescribed Nebulizer Ipratropium bromide.

The different categories of antibiotics prescribed in acute bronchitis and pneumonia are beta-lactam antibiotics (37.27%) macrolides (22.76%) cyclic polypeptides (4%) aminoglycosides (4%) highly prescribed cephalosporins (68%) in

72 patients followed by macrolides (22.76%) in 23 patients. The different formulations of bronchodilators include Neb. Bronchodilators, syrup Acebrophylline were equally prescribed for either group of Patients. Earlier literature also showed the similar treatments [9, 10].

In different studies previously we have observed that bronchodilators were preferred in pneumonia, bronchitis, asthma, and Chronic obstructive pulmonary disease (COPD) children. In most of the Patients, we observed that a combination of bronchodilators and corticosteroids was prescribed nebulizers were prescribed more than the inhaler in all the Patient Groups.

## CONCLUSION

This study found that both males and females had a common incidence of acute bronchitis and pneumonia. In the current study, our present study concludes that the prescription rates of bronchodilators were comparatively higher than the previous studies. The most commonly prescribed drug doses for pneumonia and acute bronchitis are bronchodilators (35.145%) followed by antibiotics (68%) and corticosteroids (16.25%). The most prescribed drug classes for pneumonia and acute bronchitis were bronchodilators along with antibiotics. The average number of prescriptions written was lower, generic names were prescribed, and polypharmacy was decreased. Part of medical audit is

prescribing pattern analysis, which tracks and evaluates prescriber trends and makes recommendations for changes that are required to provide medical treatment that is both sensible and economical. A foundation for ongoing prescription audits in a hospital context can be provided by the findings of this study on drug prescribing habits. This will rationalize prescribing methods, which will assist prescribers in improving patient management. In addition to medication prescriptions, patients should get education regarding the causes and prevention of acute bronchitis and pneumonia risk factors.

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