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RESEARCH ARTICLE

PHARMACOEPIDEMIOLOGICAL ASSESSMENT OF RESPIRATORY DISEASES IN PEDIATRIC DEPARTMENT OF A TERTIARY CARE TEACHING HOSPITAL

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ABBREVATIONS

ARI – Acute Respiratory Infection
AEC – Absolute Esinophil Count
CRP – C-Reactive Protein
DLC – Differential Leucocyte Count
ESR – Erythrocyte Sedimentation Rate
Hb - Hemoglobin
LFT – Liver Function Test
LRTI – Lower Respiratory Infection
PFT – Pulmonary Function Test
PPI – Proton Pump Inhibitors
SABA - Short Acting beta 2 Agonist
TB – Tuberculosis
TLC – Total Leucocyte Count
URTI – Upper Respiratory Tract Infection
WHO – World Health Organisation

ABSTRACT

Background: Respiratory disorders are one of the most common diseases in pediatrics with an increase in morbidity and mortality. Bronchodilators, Corticosteroids and Antibiotics were used primarily for the management of respiratory disorders in Pediatric Population. **Objective:** To assess utilization pattern of drugs in Pediatric Respiratory diseases **Materials and Methods**: A prospective observational study was conducted over a period of six months in a tertiary care teaching hospital. A total of 225 case records of inpatient in pediatric department was reviewed. The relevant information was recorded in structured proforma and data was evaluated using descriptive analysis. **Results**: Case records of 225 patients who were admitted in the pediatric department were observed. Out of 225 patients 122(54.2%) were female children and 103(45.8%) were admitted due to respiratory diseases. Maximum number of patients was in the age group of 2-11 years (49.8%), 28 days-23 months (48.9%) and least were found in 12-18 years (1.3%). The duration of the hospital stay for most of the pediatric patients i.e., (36.4%) was found to be 5 days. Most of the patients were admitted due to cough and cold 220(47.36%). Most of the patients have been diagnosed with LRTI (42.2%). It was observed that most of the drugs prescribed were Bronchodilators (33.02%). Among Bronchodilators SABA 258(81.6%) were prescribed in which salbutamol were prescribed more (77.5%). Most of the bronchodilators were prescribed in the Nebulization form (87%) followed by oral formulation (13%). Majority of the antibiotics prescribed were Cephalosporin's (58.8%), and among the Corticosteroids, Budesonide were prescribed most (26.32%). **Conclusion:** The study found over use of antibiotics and under use of steroids. Bronchodilators uses were found to be optimal. In order to reduce the risk of antibiotic resistance of microbes, an antibiotic policy should be carefully instituted and implemented**.** Educational interventions must be implemented for health care professionals for more appropriate and cost effective prescribing.

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INTRODUCTION

Respiratory diseases remain a major cause of morbidity and mortality in children especially among children less than five years old .The spectrum of respiratory illnesses is wide and includes diseases of upper and lower airways, communicable and non-communicable types. The variations in pattern of morbidity and mortality of respiratory illnesses may be affected by different home/environmental and climatic variations in different parts of the world. The WHO estimates that approximately 10.6 million children under five years of age die each year, ARI, especially pneumonia, contributes about 19% of the total number of deaths (Oguonu *et al*., 2014). Acute and chronic respiratory diseases represent a global public health problem because of their increasing prevalence and severity worldwide. This can be attributed to several factors: (i) the significant increase in the prevalence of early allergen sensitization in childhood; (ii) the frequent recurrence of viral infections typically associated with children; and (iii) the increased survival of extremely preterm and fragile children born with Broncho pulmonary dysplasia. All these factors contribute to the increased risk of acute manifestations becoming chronic. Also lung function persistently deteriorates thereby leading to the development of chronic respiratory diseases in adulthood. For anti-inflammatory action, corticosteroids are widely used to treat respiratory diseases in pediatric practice.

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However, the decision whether or not to administer a glucocorticoid in case of acute respiratory disease must be made based on evidence of efficacy and according to guidelines. There are no convincing data supporting the use of corticosteroids to treat bronchiolitis. Oral corticosteroids may be beneficial in preschool children with severe wheezing exacerbations that require emergency department or hospital admission, but currently they are not indicated in preschool children affected by mild exacerbation of viral wheeze. In case of moderate and severe asthma attacks, all clinical guidelines agree that oral corticosteroids should be administered since they result in fewer and shorter hospitalizations. In particular, guidelines recommend oral prednisolone for the early treatment of acute asthma exacerbations. Oral corticosteroids are the treatment of choice for children with mild-to-moderate croup. Although corticosteroids exert a beneficial effect on the course of different acute respiratory diseases in childhood, the type of corticosteroid to administer and the appropriate dosage should be carefully evaluated in order to minimize potential adverse effects (Cutrera *et al*., 2017).

Respiratory tract infections are frequent among children and are commonly treated with antibiotics. Antibiotics have a major role in the treatment of bacterial infections, which have led to significant reduction in child morbidity and mortality rates worldwide Despite the effectiveness of antibiotics in the treatment of numerous bacterial infections, it is often used inappropriately. This misuse of antibiotics is currently one of the major public health issues worldwide. Antibiotic misuse was found to be significantly frequent in children, especially when presenting with viral URTIs. Although antibiotics have a significant role in the reduction of morbidity and mortality rates worldwide, their in-creasing inappropriate consumption leads to the development of bacterial resistant strains. Such resistance to antibiotics is likely to lead to reduction in the effectiveness of many antibiotics (Alumran, 2011). Despite the best efforts with the different intervention programs recommended by multilateral agencies such as the WHO UNICEF respiratory diseases still constitute some significant burden to children. There are similarities in proportion and variation in the types of diseases in the low/ middle and the high income countries. It thus requires more effort among all concerned to reduce the disease burden and should be directed at improvement in the intervention methods and or more commitment by the stakeholders in implementation of the existing methods. Attention should be paid to respiratory diseases in children to reduce the morbidity in the population. A comprehensive study in the community on the epidemiological factors associated with morbidity and mortality should be undertaken in order to determine the prevalence and plan interventions on management of the diseases (Oguonu *et al*., 2014). There were only few Indian studies carried out to assess the prescribing patterns of drugs used in Paediatric Respiratory diseases. In this context we planned to conduct the study to understand about the respiratory diseases, how and why drugs are used, so that the drug use and health outcome can be improved. It can play a key role in helping the health care system to understand, interpret, and improve the prescribing and use of drugs.

MATERIALS AND METHODS

A Prospective observational study was carried out for 225 patients in the pediatric department of a tertiary care teaching hospital, Raichur for six months.

The study was approved by Institutional Ethical Committee of the hospital and issued the ethical clearance certificate. Study ward were visited daily by the project team as per schedule. A total of 225 cases of respiratory diseases diagnosed by qualified medical doctors were collected from wards. Data were collected on a pretested case record form which included information on patient characteristics, Pattern of respiratory diseases, Duration of stay, Lab investigations with special preference to PFT, Type of management, dose, duration, route of administration, categories of drugs and average number of drugs prescribed. Descriptive statistics was used to summarize the demographic characteristics, disease data and drug data of the patients. Frequencies and proportions / percentages were used to describe variables.

Inclusion Criteria

- Pediatric who were diagnosed with Respiratory diseases.
- Pediatric Patients of age 0-18 yrs admitted in pediatric ward.

Exclusion Criteria

- Paediatric patients whose diagnosis is not clear or provisionally diagnosed.
- Paediatric patients who were admitted in emergency department.
- Paediatric patients who received corticosteroids or bronchodilators for prophylactic surgery.
- Paediatric patients visiting OPD.

RESULTS AND DISCUSSION

A prospective observational study was carried out by observing 225 patient records. Out of 225 patients 122(54.2%) were females and 103(45.8%) were admitted due to respiratory diseases.

Table 1. Age distribution (n=225)

Age*	No. of Patients	Percentage (%)
Pre term (new born infant)	0	0
New born infants (o-27 days)	0	0
Infants and toddlers (28 days-23 months)	110	48.9
Children(2-11 years)	112	49.8
Adolescents(12-18years)	03	1.3

*As per International committee on Harmonization (2001)

Table 2. Categories of drugs prescribed for Pediatric Respiratory diseases (n=957)

Categories	Number	Percentage (%)
Bronchodilators	316	33.02
Antibiotics	221	23.1
Corticosteroids	19	1.98
Mucolytic	41	4.3
Leukotriene modifiers	6	0.6
Expectorants	7	0.7
Miscellaneous drugs*	347	36.3

*Miscellaneous drug's: Antiemetic, Antihistamine's, PPI's, Antipyretic's

Table 3. Concurrent drugs prescribed (n=347)

Concurrent drugs	Number	Percentage (%)
Antiemetic	76	22
Antihistamines	47	13.5
PPI's	68	19.6
Antipyretics	156	44.9

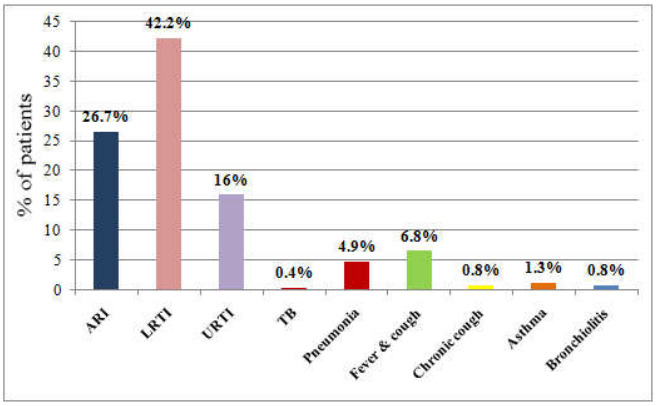

Fig 1. Various clinical conditions under treatment (n=225)

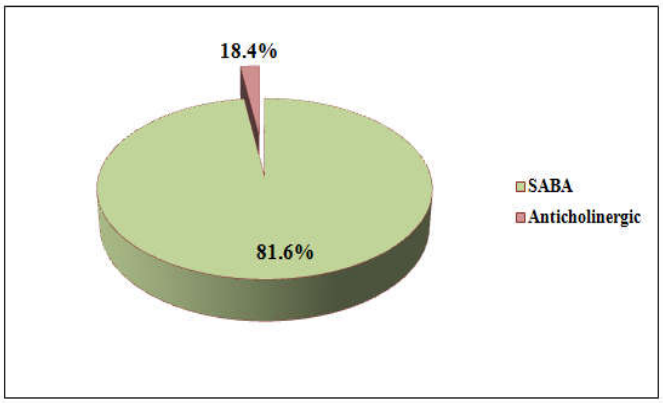

Fig. 2. Categories of Bronchodilators prescribed (n=316)

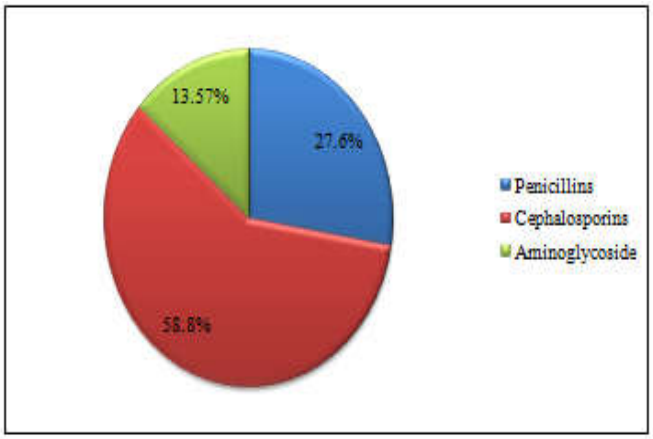

Fig 3: Categories of antibiotics prescribed (n=221)

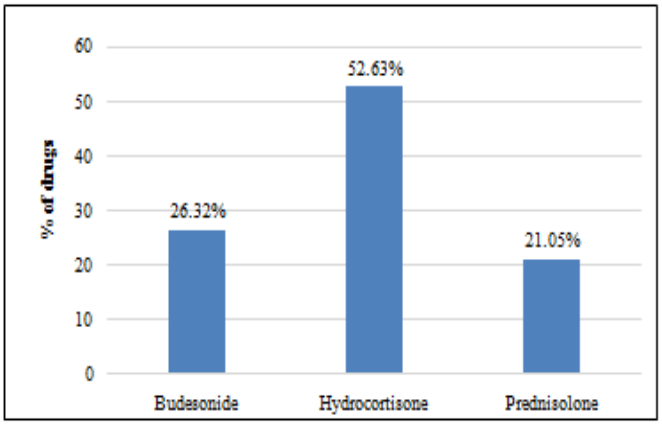

Fig 4. Categories of corticosteroids prescribed (n= 19)

Maximum number of patients was in the age group of 2-11 years (49.8%), 28 days-23 months (48.9%) Infants and toddlers (28 days- 23 months) - (48.9%), and least were found in the age group of Adolescents (12-18years)-(1.3%). The duration of stay in hospital was found in most of the patients for 5 days (36.4%), followed by 4 days(19.1%), 6days(16.9%), 7 days(11.1%), 3 days (8.9%), and>8days (4.5%). and least were found in 12-18 years (1.3%) as shown in Table 1. Majority of children were admitted in the hospital due to cough and cold i.e., 220 (47.36%) followed by fever 163 (35.1%), hurried breathing39 (8.38%), others like swelling in both limbs, sputum production 23(4.94%), Difficulty in breathing and running nose 08(1.72%), Wheezing 03(0.6%), and nasal block 01(0.2%) respectively. Cough and cold were the main symptoms for the respiratory diseases which were supported by the results of the previous study conducted by Roma KM *et al*. Majority of pediatric patients under gone laboratory investigation of Hb 222 (24%) followed by TLC 213 (22.9%), DLC 214(22.8%), ESR 97(10.4%), AEC 49(5.3%), Electrolytes 44(4.7%), LFT 35(4.1%), CRP 22(2.4%), Urine analysis 03(0.3%). These tests were performed for confirming respiratory disease. Culture sensitivity test was performed only for 5(0.5%) and Chest X ray 24(2.6%) patients. There is a need for Chest X ray and culture sensitivity testing for diagnosing the type of respiratory disease, PFTs like Spirometry has to perform for confirming diagnosis of Asthma.

Most of the pediatric patients were diagnosed with LRTI 95(42.2%), followed by ARI 60(26.7%), URTI 36(16.0%), Fever and cough 15(6.8%) Pneumonia 11(4.9%), Asthma 3(1.3%), Bronchiolitis and Chronic cough 02(0.8%), TB was observed in one patient as shown in Fig.1. This data was supported by the same study previously conducted by Kokani *et al*. The categories of the drug's prescribed for the treatment of the Pediatric Respiratory diseases were Bronchodilator's 316(33.02%), Antibiotics 221(23.1%), Corticosteroids 19(1.98%), Mucolytic41(4.3%), Leukotriene modifiers 06(0.6%), Expectorants07(0.7%), Miscellaneous drugs 347 (36.3%) as shown in Table 2. Table 3 shows Miscellaneous drugs, include Antipyretics which were prescribe more (44.9%), antiemetics (22%),Proton pump inhibitors(19.6%) followed by antihistamines (13.5%) These were prescribed for the patients to release symptoms and control causative agents and prevent further progression of diseases. Bronchodilators are central to the treatment of respiratory diseases because they alleviate bronchial constriction and airflow limitation, reduce hyperinflation and improve emptying of the lung and exercise performance. The study shows bronchodilators were prescribed more followed by antibiotics which were supported by the results of the previous study conducted by Geetha *et al*. Among Bronchodilators SABA (81.6%) were prescribed and salbutamol were prescribed more i.e., (77.5%) followed by Terbutaline (4.1%) and Anticholinergics (18.4%) among that only ipratropium bromide were prescribed (18.4%) as shown in Fig 2. Salbutamol was mostly prescribed because it is one of the most common medicines used in rescue inhalers and helps in fast relief from symptoms which were supported by the results of the previous study conducted by Kumar *et al*. Out of 316 Bronchodilator therapy 275 (87%) of drugs were given by nebulization and 41(13%) drugs by oral route. Nebulization therapy is used to deliver medications along the respiratory tract and is indicated to various respiratory diseases. And the same result was supported by the study conducted by Ahmed *et al*. The Antibiotics prescribed were Cephalosporin's 58.8%, Penicillin's 27.6%, and Amino glycosides13.57% as shown in

Fig 3. Most of the studies showed that Penicillin's were the most commonly prescribed antimicrobials but in our study we found that cephalosporin's were mostly prescribed antimicrobials. Among the antibiotics ceftriaxone 49.3% were prescribed more followed by cefotaxime 9.5%, Ampicillin 25.3%, Amoxicillin 2.3%, and Amikacin13.6% All the Antibiotic therapy were given by Intravenous route only. Fig 4 shows the categories of corticosteroids prescribed in which budesonide 26.32% were given to the children followed by hydrocortisone (52.63%). Prednisolone given only to 21.05% of children**.** The corticosteroid therapy reduces the risk of hospitalization of respiratory disease. And the same result was supported by the study conducted by Ahmed *et al*. Majority of Corticosteroids were prescribed in the form of intravenous 52.63%, followed by oral 21.05% and Nebulization 26.32%**.** Majority of the patients diagnosed with respiratory diseases, apart from bronchodilators therapy, they were also received Antiemetic 22%, Antihistamines13.5%, PPI's 19.6%, Analgesics 44.9%, for the management of disease**.**. These drugs were prescribed to relieve symptoms, control causative agents and prevent the progression of the disease. This result was supported by the study conducted by Joseph *et al*. The combination drugs prescribed were Salbutamol+ Ambroxyl (12.3%), Ipratropiumbromide+ Salbutamol (20.9%), Salbutamol+ Budesonide (0.7%), Terbutaline+ Ambroxyl+ Guafenesine (2.5%), Montelukast+ Levocetrizine (2.2%), Ceftriaxone+ Sulbactum (39.4%), Amoxicillin+ Clavulonicacid (1.8%), Ampicillin+ Salbactam (17.3%), Ampicillin+ Tazobactum (2.9%)**.** Ipratropiumbromide+ Salbutamol combination improves the condition and reduces the hospital stay this was supported by the study conducted by Harmudini.

Conclusion

The study found over use of antibiotics and under use of steroids. Bronchodilators uses were found to be optimal. In order to reduce the risk of antibiotic resistance of microbes, an antibiotic policy should be carefully instituted and implemented**.** Educational interventions must be implemented for health care professionals for more appropriate and cost effective prescribing.

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