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Prescribing Pattern of Bronchodilators in Paediatrics at A private Tertiary Care Hospital

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ABSTRACT

The use of bronchodilators has been increasing for the past few decades. Study was planned to evaluate the rational use of bronchodilator drugs by analyzing the appropriateness of the prescription. A prospective observational study was conducted in all the patients who were prescribed with bronchodilators in the pediatric ward. The demographic data and the bronchodilator prescribed were recorded in the data entry format. In the study population of 133 wheezing associated with lower respiratory tract infection was the most predominant disorder found in 35.3% children. Of the 133 pediatric patients, the major prescription was for SABA (Short Acting Bronchodilators) (99.2%). Of which the major prescription was for salbutamol (63.2%). Most of the children with asthma were prescribed with combination therapy of salbutamol and ipratropium (81.3%). In WALRI (Wheezing Associated Lower Respiratory Tract Infection), patient were prescribed with salbutamol (40.4%) and. In acute bronchiolitis, the major prescription was found to be salbutamol and ipratropium combination (70.3%). In 52.6% of the prescriptions bronchodilator were given by nebulization and oral route, 31.6% were given by nebulization. In 95.5% of patient antibiotics were prescribed along with bronchodilators, followed by mucolytic 55.6% .Other concurrent prescriptions were with steroids (38.3%). It was found that 77.4% of pediatric patients not received any oxygen supplementation. The study found over use of antibiotics, sedatives and mucolytics and under use of steroids. Bronchodilator use was optimal but evaluation of therapy was not done commonly. The study highlighted the need for a local protocol and continuing staff and parent education.

Keywords: Asthma, Bronchodilators, Salbutamol, SABA, WALRI.

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INTRODUCTION

Drug use evaluation (DUE) is an ongoing, systematic process designed to maintain the appropriate and effective use of drugs. It involves a comprehensive review of patient's prescription and medication data before, during, and after dispensing in order to assure appropriate therapeutic decision making and positive patient outcomes[1.] Monitoring the safety of medicine use in children is of paramount importance since, during the clinical development of medicines, only limited data on this aspect are generated through clinical trials. Use of medicines outside the specifications described in the license (e.g. in terms of formulation, indications, contraindications or age) constitutes off-label and off-license use and these are a major area of concern[2]. A bronchodilator is a substance that dilates the bronchi and bronchioles, decreasing airway resistance and thereby facilitating airflow. Bronchodilators may be endogenous (originating naturally within the body), or they may be medications administered for the treatment of breathing difficulties. The three types of prescription bronchodilating drugs are β_2-agonists (short- and long-acting), anticholinergics (short-acting), and theophylline (long-acting) .They are mainly used for relief of reversible bronchospasm associated with acute and chronic bronchial asthma, Exercise induced bronchospasm(EIB), Bronchitis, Emphysema, bronchiectasis, Bronchiolitis or other obstructive pulmonary diseases) [3,4] . Various bronchodilator therapies have been reported to increase the risk of death in people with asthma. Heart rate rose significantly after inhaled bronchodilator treatments. Some side effects of bronchodilators, such as tachycardia, also occurred, and these may be clinically significant. Major limitation of the beta-2 agonists lies in their overuse. When used more than every few hours on a regular basis, their effectiveness wanes, less relief is provided by successive doses, a condition termed beta blockade, beta blockade indicates a temporary but serious worsening of asthma that should initiate a call or visit to the doctor[5, 6].

Regular use of short-acting beta-2 agonists or their combinations with inhaled steroids in asthma patients becomes a matter of serious concern. Such a use could be potentially harmful to the patient as it may be associated with increased morbidity and mortality due to asthma because of poor asthma control and because of the delay in seeking medical advice during acute episodes. The partial control that these agents provide prevents a correct assessment of the degree of severity and risks involved[7]. Children receiving nebulized salbutamol may be at risk of developing cardiac complications, and cardiac monitoring should be considered in these cases.[8] A prospective audit reported inaccurate and incomplete prescribing of nebulized bronchodilators can result in uncertainty and suboptimal treatment. This prospective audit has demonstrated major deficiencies

in the prescribing and administration of nebulized bronchodilators and it has highlighted the need for a local protocol and continuing staff education [9]. The recommendation that bronchodilators should be used as required for symptom relief rather than regularly has been reinforced. Parent does not rely excessively on bronchodilator drugs when treating their child's asthma. Parents may under use bronchodilators for several reasons. They may also have underreported symptoms but administered treatment appropriate to the symptoms that were present. The fact that parents seemed to administer bronchodilator rather erratically and tended to report symptoms without treating them suggests that there is scope for improvements in educating parents. At the very least, the prescription of bronchodilators for relief of symptoms as required needs to be defined more clearly[10]. The use of bronchodilators has been increasing for the past few decades. The literatures have reported a high rate of adverse events. It has also been found out that beta-agonists are associated with an increased morbidity and mortality rate. Respiratory tolerance develops due to regular use of beta-agonists, which are widely prescribed in asthma and bronchiolitis also is of major concern[11-13].

The role of bronchodilator treatment in relieving the child's symptoms and guidelines about appropriate use must be emphasized to parents. Thus it is essential to conduct an evaluation on the safe use of bronchodilators. Therefore a prospective study on utilization pattern of bronchodilator drugs carried out in the department of pediatrics to evaluate the rational use of bronchodilator drugs.

The study was conducted in the department of Pediatrics. The reason for the selection of the department of pediatrics was that the pilot study revealed more scope for the study in the department of pediatrics as the prevalence of bronchodilator prescription is more. When prescribing bronchodilators for children in asthma or other pulmonology disorders, the Pediatrician should assess the severity of the disorders and dose or dosage should be adjusted according to the guidelines. Comparison of current practice by standard guidelines and the report of deviation from guidelines will help the health care professionals to select the appropriate bronchodilators to ensure rational therapy.

MATERIALS AND METHOD

A Prospective observational study was carried out in department of pediatrics, which is attached to a 500 bedded multi-specialty, tertiary care teaching hospital at Coimbatore. The study was conducted with expert guidance of the Clinical Pharmacy Professionals and Senior Pediatricians of the study department. For obtaining the clearance certificate , an application along with study

protocol , which includes the proposed title, study site including various departments required, duration, inclusion and exclusion criteria, objective and a brief methodology about the work to be carried out was submitted to the Chairman of the Institutional Ethics Committee of Sri Ramakrishna Hospital and Research Centre . The study was approved by Committee by issuing ethical clearance certificate.

All the patients who were prescribed with bronchodilators in the Pediatric ward were included in the study. Only inpatients were included in the study. The outpatients and intensive care patients were excluded in the study.

A separate data entry format for incorporating inpatient details was designed**.** The format contains provisions to enter the details such as name, age, sex, height, weight, temperature, IP No, date of admission, date of discharge, reason for admission, patient past medication history, patients past medical history, vital signs .Provision is given in the format to enter laboratory investigations and pulmonary function tests, diagnosis, drug chart, Categories of bronchodilators prescribed, drug interactions and adverse drug reactions. Intervention done by the clinical pharmacist in prescription was recorded and reported to the concerned physicians during the regular ward rounds. Descriptive statistics was used to analyze the data.

RESULTS AND DISCUSSION

In the study population of 133 patients male children were found to be more (58.6 %) than the female children (41.4%). Most of the pediatric patients treated with bronchodilators were infants (48.1%) followed by children 47.4%% and adolescents 3.8%**.**The duration of hospital stay was 3 days for 28.6% of pediatric, 4 days for 24.8% patients, followed by 2 days for 17.3% patients and more than 6 days for 7.5% patients. The major complaints reported include cough & breathing difficulty (89.5%) fever for 74.4% patients, cold in 60.9% children, breathing difficulty in 52.6% patients, wheezing in 12% children and chest tightness in 8.3% patients (Figure 1).

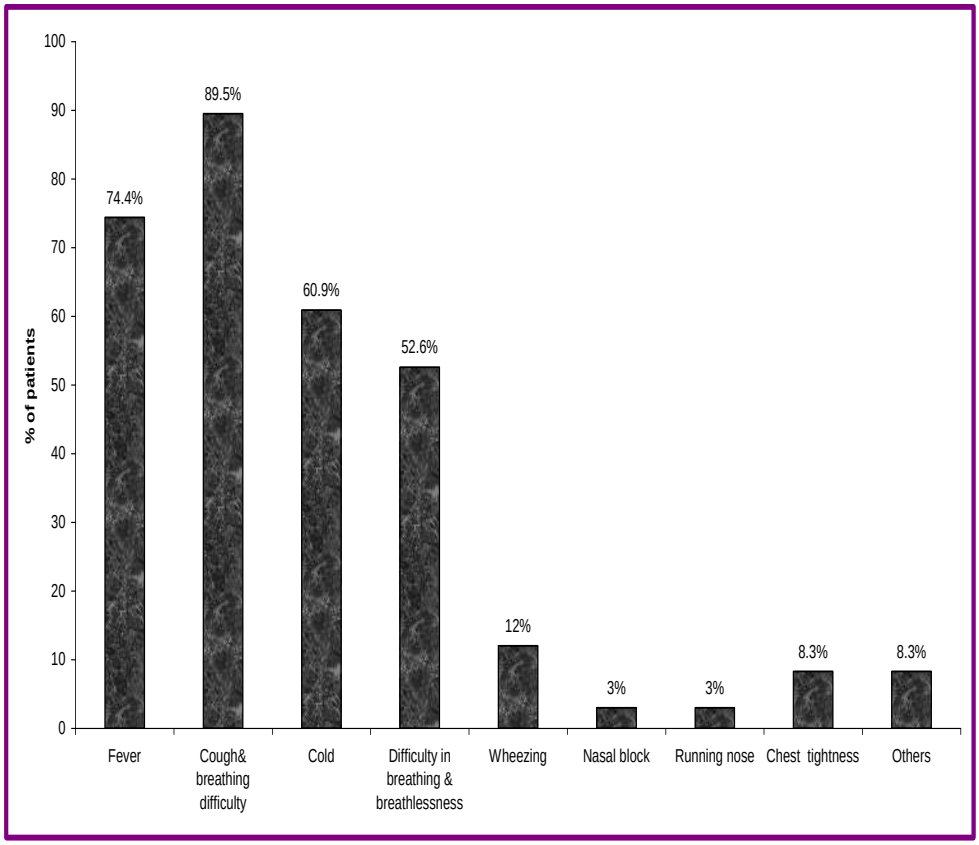

Figure 1: Reason for admission (n=133)

Of the 133 children, the major laboratory investigation performed was determination of differential leukocyte count & Hb (96.9%), TLC (93.9%), CRP (54.9%), ESR (25.6%), and IgE (19.5%). Pulmonary function tests were performed only for 4.5% of the study population. Chest X-ray was performed for 72.9% patients and absolute eosinophil count was performed in 20.3% of the study population. Wheezing associated with lower respiratory tract infection was the most predominant disorder found in 35.3% children followed by acute bronchiolitis in 20.3% patients, acute asthma in 12 % patients (Table 1).

Table 1: Various clinical conditions under therapy (n=133)

S. No	Disorders	No. of patients	Percentage (%)
1	Wheezing associated with lower respiratory tract infections	47	35.3
2	Acute bronchiolitis	27	20.3
3	Acute bronchitis	9	5.2
4	Upper respiratory tract infections	4	3
5	Short pyrexia	11	8.2
6	Acute asthma, Hyper reactive airway disease	16	12
7	Pneumonia	6	4.5
8	Acute otitis media	6	4.5
9	Pyrexia of unknown origin	7	5.2

The majority of the clinical conditions were in moderate state which was about 39.8%, 33.1% of cases were in severe condition and 27.1% were in mild condition (Figure 2). Of the 133 pediatric patients the major prescription was for SABA(99.2%). 50.3% of the patients were prescribed with anticholinergics, methyl xanthines were prescribed for 7.5% patients only (Figure 3). Of the 133 pediatric patients the major prescription was for salbutamol (63.2%). 50.3% of the patients were prescribed with Ipratropium + salbutamol combination and 30 % with terbutaline alone. Levosalbutamol was prescribed for18.8% patients, 4.5% patients were prescribed with salbutamol +choline theophylline combination. Only 2.3 % of patients were prescribed with doxophylline & ipratropium each (Figure 4). Children with asthma were prescribed with salbutamol + ipratropium combination (81.3%), Salbutamol and terbutaline were prescribed for 56.3% each. 25% of patients were prescribed with levosalbutamol and salbutamol + choline theophylline combination (Figure 5).

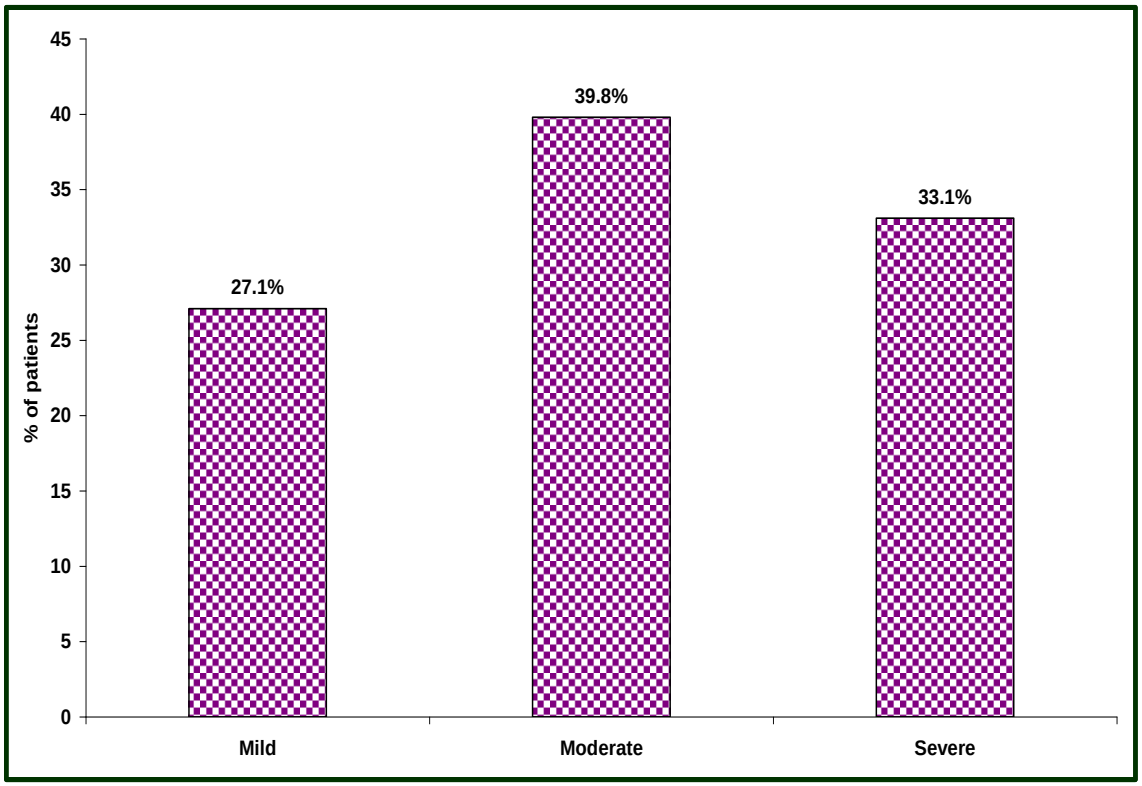

Figure 2: Status of various clinical conditions treated with bronchodilators (n=133)

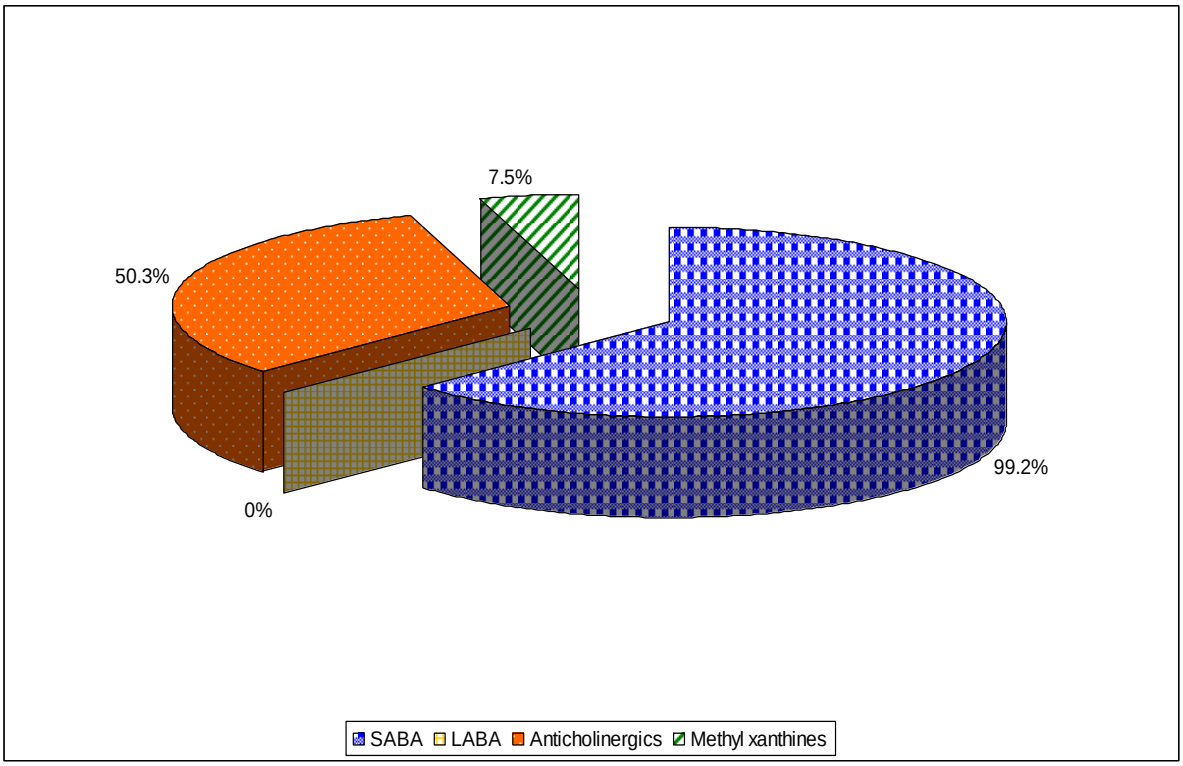

Figure 3: Category of bronchodilators prescribed (n=133)

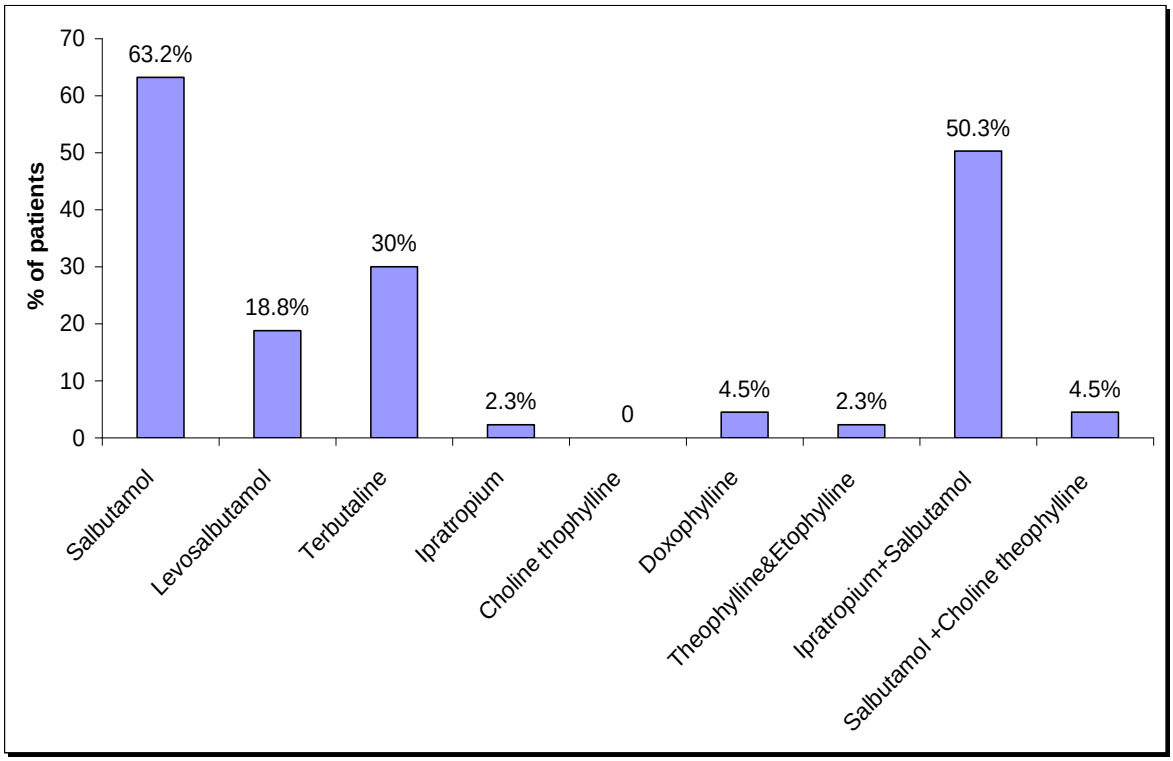

Figure 4: Break up of bronchodilators prescribed (n=133)

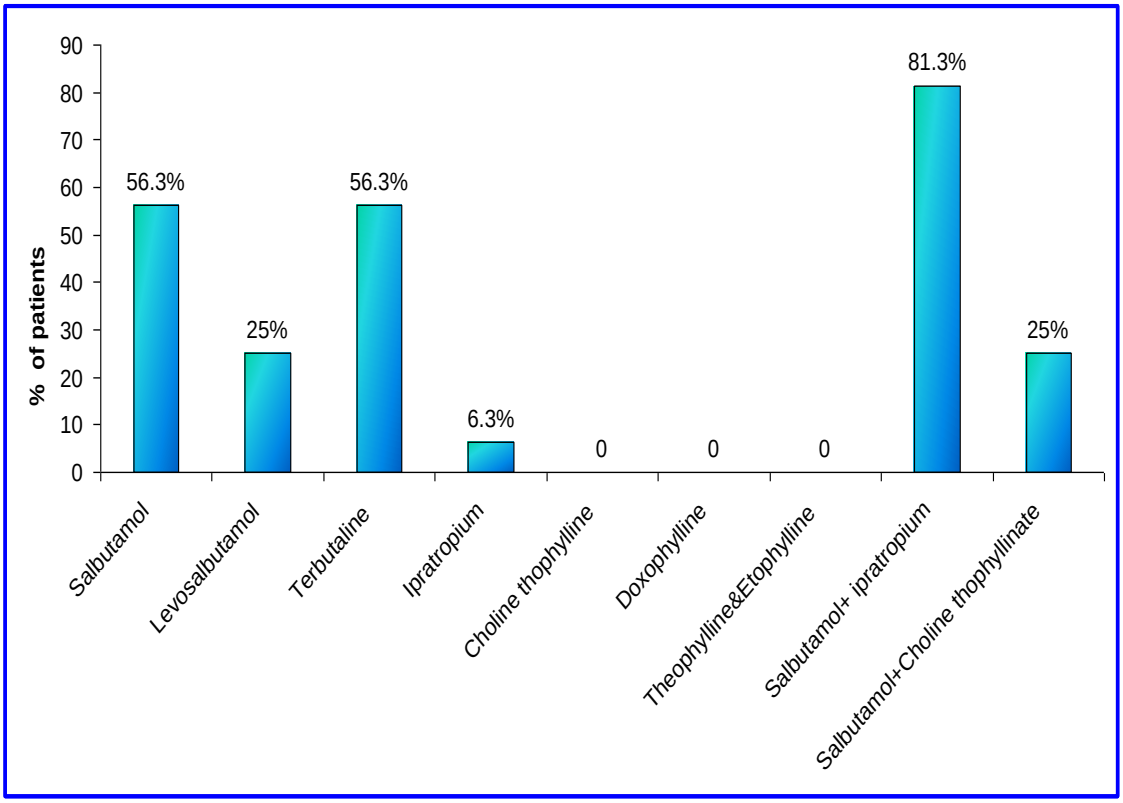

Figure 5: Breakup of bronchodilators prescribed for asthmatics (n=16)

In WALRI the major prescription was for salbutamol alone (40.4%) and 36.2% were prescribed with terbutaline. 31.9% of the patients were prescribed with salbutamol +ipratropium combination. Levo salbutamol was prescribed for 21.3% of patients. Only 6.3% of pediatric patients were prescribed with ipratropium alone (Figure 6). In acute bronchiolitis, the major prescription was found to be for salbutamol + ipratropium combination (70.3%) followed by 51.9 % for salbutamol. Terbutaline was prescribed for 18.5% and only 7.4% patients were prescribed with levosalbutamol (Figure 7). In 52.6% of the prescriptions bronchodilator therapy was given by nebulization and oral route. 31.6% were given by nebulization and 9% were given by oral, only 2.2 % accounted for inhalation and 1.5% were given by IV + Neb, Neb +Inh, Neb+Oral+Inh each(Figure 8). Major prescriptions of bronchodilator drugs were with antibiotics 95.5% followed by mucolytics 55.6%. Other concurrent prescriptions were with steroids 38.3%, expectorants 48.9%, electrolytes 54.1%, analgesics & antipyretics 18.4%, vitamins 8.3%, antivirals and anti histamines 5.3% each and anti ulcer 6.0%(Figure 9).

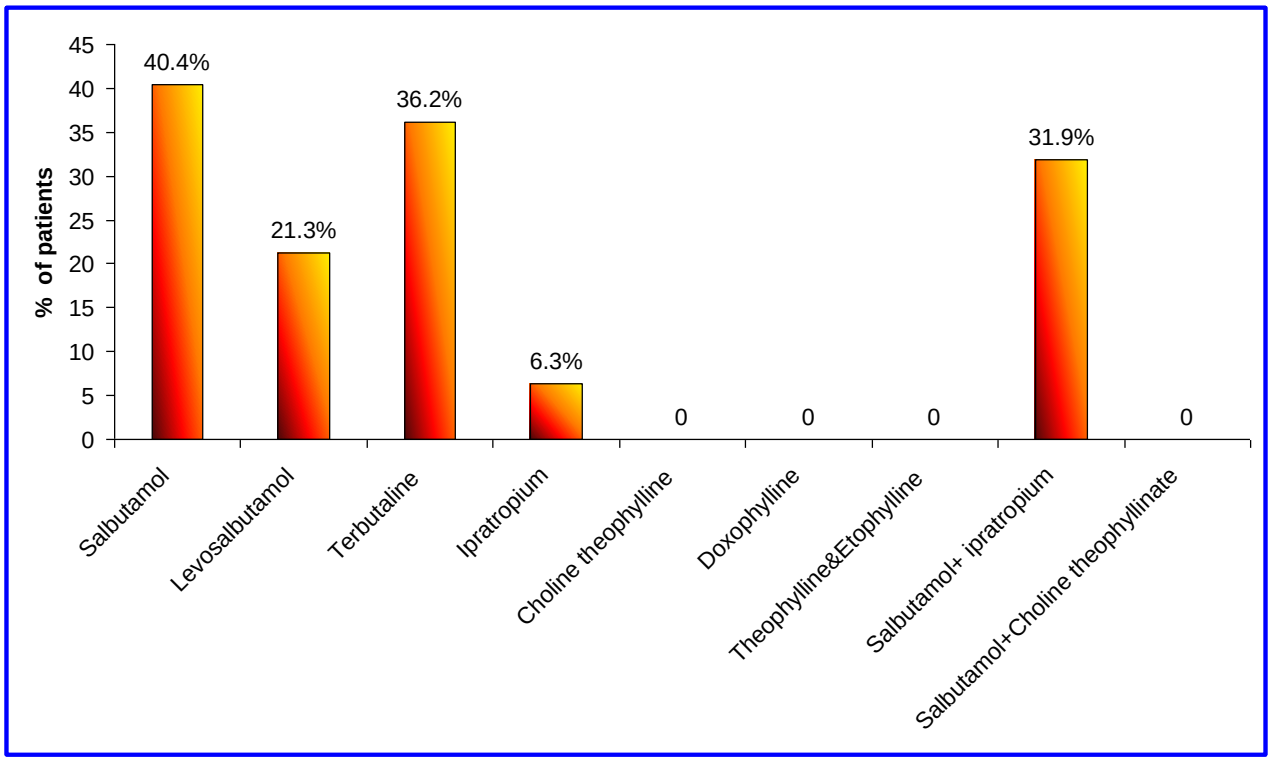

Figure 6: Breakup of bronchodilators prescribed for wheezing associated with lower respiratory tract infections (n=47)

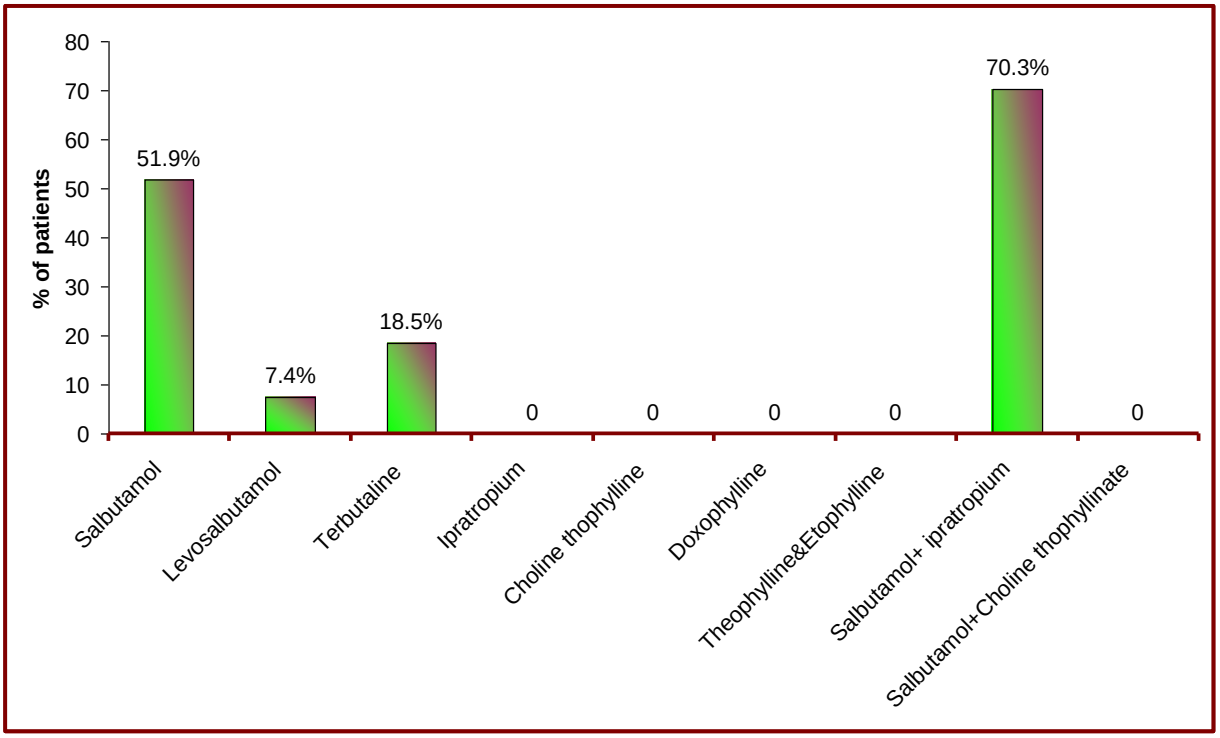

Figure 7: Break up of bronchodilators prescribed for bronchiolitis (n=27)

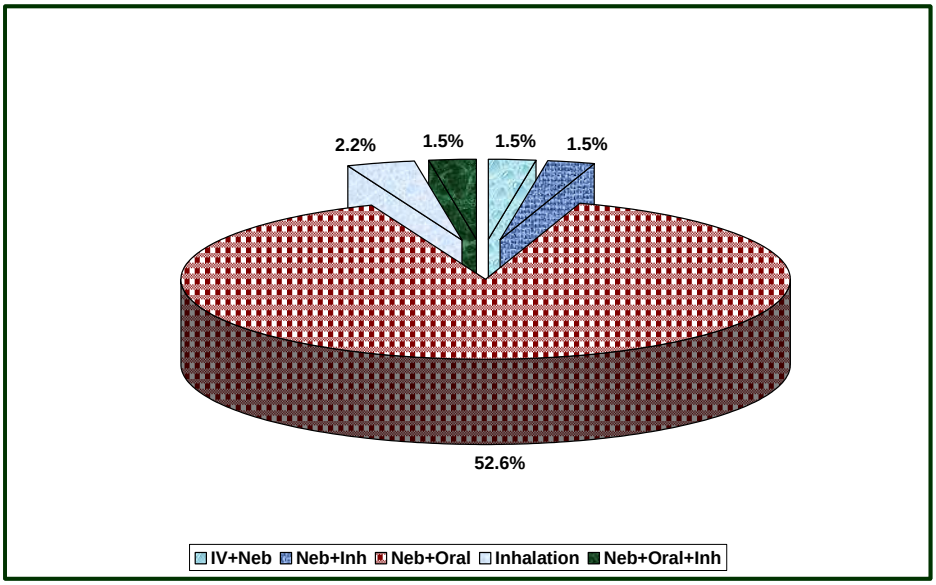

Figure 8: Route of administration of bronchodilators (n=133)

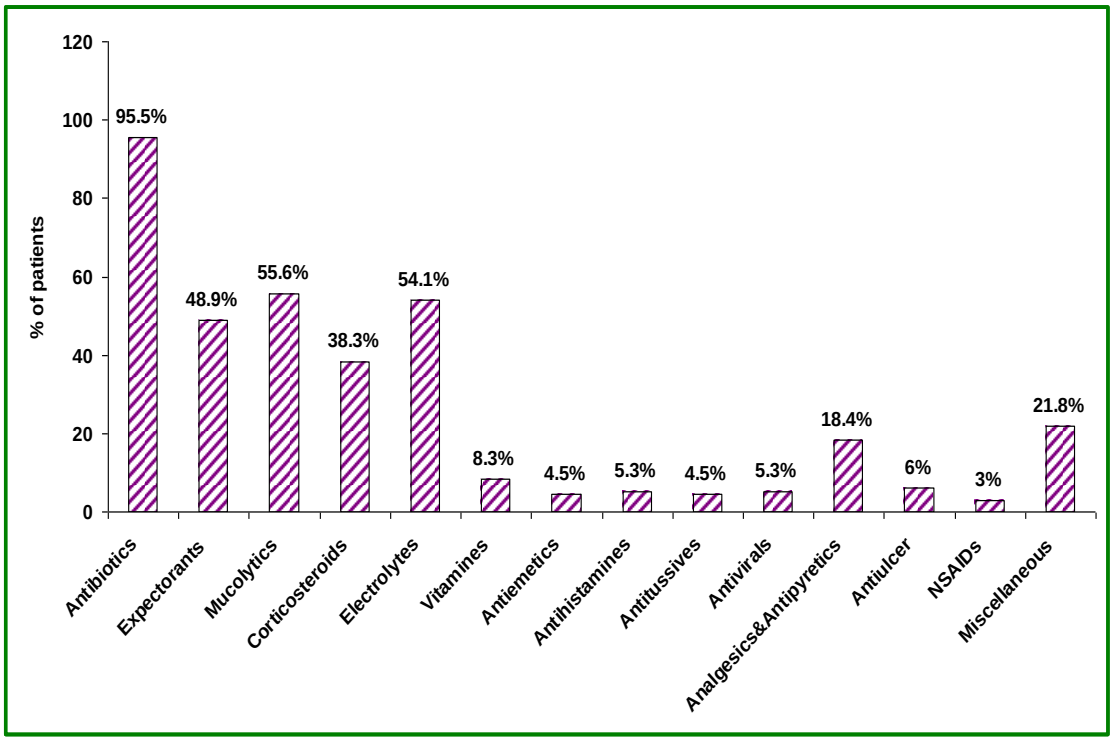

Figure 9: Concurrent drugs prescribed (n=133)

There were, in total, 133 prescriptions for bronchodilator drugs recorded in pediatric ward**.** Major class of bronchodilator prescribed was short- acting β_2 agonists in 99.2% of patients followed by anticholinergics 50.3%where guidelines recommend that short- acting β_2 agonists should be used in acute conditions. LABA have no role in the management of acute asthma,so they were not prescribed.

Salbutamol (63.2%) alone was the major prescription for most of the patients.Studies says that

children receiving nebulised salbutamol may be at risk of developing cardiac complications, and cardiac monitoring should be considered in these cases. 50.3% of the patients were prescribed with Ipratropium and salbutamol combination .This combination were most commonly used in asthma (81.3%), WALRI(40.4%) ,and bronchiolitis (70.3%). Inhaled ipratropium may add to the bronchodilator benefits seen with inhaled short- acting β_2 agonists . The addition of ipratropium bromide to beta-2 agonist may be more effective than beta $_2$ agonist alone at reducing the need for further drug treatment at 45 minutes in infants presenting to emergency departments, but not at improving "excellent" clinical response[11]. In 52.6% of the prescriptions bronchodilator therapy was given by nebulization and oral route. 31.6% were given by nebulization. Guidelines also say that nebulizer may be suitable for all age groups and recommended mode for patients with severe episodes or on ventilator. A study by Jougon (2003) reported that nebulization of bronchodilators develop spontaneous pneumomediastinum and subcutaneous emphysema.[14]

Major prescriptions of bronchodilator drugs were with antibiotics 95.5% followed by mucolytic 55.6%. Other concurrent prescriptions were with steroids 38.3%, expectorants 48.9%,but guidelines recommended that antibiotics are not routinely required since bacterial infections seldom trigger asthma . Consider antibiotics only in those who do not improve in response to bronchodilators, have purulent secretions or have radiological hematological evidence of infection.[15]It was found that bronchodilators were routinely prescribed for children with bronchiolitis. Salbutamol was prescribed for 51.9% and salbutamol + ipratropium combination were given to 70.9% of patients. Similar study conducted by *Franz (2008) reported that* no medications were used for mild or moderate bronchiolitis [16.] Inhaled [beta]-agonists were used for moderate and for severe bronchiolitis and another study conducted by Karadag 2008 [11]reported that Clinical scores and oxygen saturation levels improved more rapidly in the bronchodilator groups than in the placebo group up to 24 h, but these drugs did not have a sufficient effect to change the natural course of the disease. New Bronchiolitis Guidelines 2006 American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis recommended that Bronchodilators should not be used routinely for management. An optional trial of an α- or ß-agonist should be continued only if objective evaluation indicates a clinical response. Most positive studies of bronchodilators for management of bronchiolitis show transient improvement of unclear clinical significance.[17]

CONCLUSION

The study highlighted the need for a local protocol and continuing staff and parent education. The

study had limitations. The study was carried out over a 8 months period and seasonal variations in the disease pattern and drug utilization were not considered .Seasonal variations should be explored further in future studies.

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REFERENCES

1. The Academy of Managed Care Pharmacy. Concepts in Managed Care Pharmacy: Drug use evaluation. Revised: November 9, 1999 Available from URL: http://depts.washington.edu/ expharmd/ExPharmD.DUE. html.
2. World Health Organization 2007. Promoting safety of medicine for children available from URL http://www.who.int/medicines/publications/essential medicines/ Promotion_safe_ med_childrens.pdf.
3. Undem BJ: Pharmacotherapy of asthma. In: Brunten LL, Lazo JS, Parker KL, editors. Goodman & Gilman's. The pharmacological basis of therapeutics Mc Graw-Hill Companies, USA, Edition 11, 2006:717-730.
4. Cada DJ, Covington TR, Generali JA, Hussar DA, Lasagna L and Selevon JR : Drug facts and comparisons . USA, Edition 57, 2003:721-767.
5. Daniel LL, Abhinav G, Leila JH, Scott S, Dean JJ and James LC: A prospective randomized controlled blinded study of three bronchodilators in infants with respiratory syncytial virus bronchiolitis on mechanical ventilation. Journal of Pediatric Critical Care Medicine 2008; 9(6):598-604.
6. Machtingers. Asthma medications. Available from URL http:// www. Allergic.net/
7. Gupta A: Use of fixed combination preparations of inhaled short acting beta-2 agonists and inhaled corticosteroids. Society for asthma care and Research. Indian pediatrics 2000; 37:752-754.
8. Kaller KA and Bhisitkul DM: Supraventricular tachycardia: A complication of nebulised

albuterol. Pediatr Emerg Care 1995; 11: 98-99.

9. Khoo SM and Lim TK: Prescribing and administration of nebulized bronchodilators: Aprospective audit in a university hospital. Respirology 2003; 8 (2): 205-207.
10. Ferguson A E, Gibson N A, Aitchison TC and Paton JY: Measured bronchodilator use in preschool children with asthma. British Medical Journal 1995; 310:1161-1164.
11. Karadag B, Ceran O, Guven G, Dursun E, Ipek I O and Karakoc F: Efficacy of Salbutamol and Ipratropium Bromide in the Management of Acute Bronchiolitis - A Clinical Trial Respiration 2008;76 (3) :283-287.
12. Sharma AS, Litonjua AAA, Tantisira KGA, Fuhlbrigge ALA, Szefler SJ A, and Strunk RCA: Clinical predictors and outcomes of consistent bronchodilator response in the childhood asthma management program. Journal of allergy and clinical immunology 2008; 122(5): 921-928.
13. Toit G D, Brown G, Joshua B, Motala C, Nell H and Weinberg E G: Evaluation of the bronchodilator effect and side effect profile of a salbutamol dry powder inhaler device. The Internet Journal of Pediatrics and Neonatology.2004;4(1)
14. Jougon JB, Ballester M, Delcambre F, Bride TM, Dromer CEH and VellyJ: Assessment of spontaneous pneumomediastinum: experience with 12 patients. The Annals of Thoracic Surgery 2003; 75(6): 1711-1714 .
15. Indian academy of pediatric medicine: asthma by consensus (consensus statement on the diagnosis and management of asthma in children [online]. 2003 available from URL http//grand am.websie wlcome.com/IAP files/asthma-3 pdf.
16. Franz E B, Nisa S, Jocelyn N, Meredith B and Oakley: Bronchiolitis management in pediatric emergency departments in Australia and New Zealand: a predict study. Pediatric Emergency Care 2008; 24 (10): 656-658.
17. American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis. Pediatrics 2006; 118:1774-93. Available from URL. http://www.jwatch.org/ .