

Study of Prescribing Pattern and Impact of Pharmaceutical Care in Bronchial Asthmatic Paediatric Patients in a Tertiary Care Teaching Hospital

Vengala Bhavan Kumar¹, Tina Mariam Thankachan¹, Anuradha Amanapu¹, Devineni Surya Chandra¹ and Sundararajan Parimala Krishnan²

¹Department of Pharmacy Practice, Rajah Muttiah Medical College and Hospital (RMMCH), Chidambaram-608001, India.

²Department of Pharmacy, Annamalai University, Chidambaram-608001, India.

ABSTRACT

Background: Asthma is a chronic inflammatory disease of increasing prevalence that is a result of genetic predisposition and environmental interaction and one of the most common chronic diseases of childhood. **Aim and Objective:** The aim is to study the prescribing pattern and impact of pharmaceutical care in bronchial asthmatic paediatric patients. The present study was conducted in RMMCH, Chidambaram. Over a six month period patients who were diagnosed with Bronchial asthma was enrolled and the information was gathered using validated data collection form. The overall asthma cohort included in the study based on inclusion criteria. Subjects under 12 years of age, and who are newly diagnosed and admitted in paediatric wards for Bronchial asthma. **Results:** A total of 61 patients were included out of which 43 (70.4%) are boys and 18 (29.6%) are girls. β -agonists (Salbutamol, Ipratropium bromide) accounts for highest number of 51 out of 61 prescriptions. Among antibiotics crystalline penicillin was present in highest number of prescriptions (86.8%). Drugs used in RMMCH were compared to various EDL (Essential drug list) which complied with national EDL. The pharmaceutical care outcomes was measured and a significant difference was observed between the lung functions tests (FVC; $P = <0.001$) and (FEV; $P = <0.008$). Which indicates the improvement of pharmaceutical care from control (30 without intervention) to test (31 with intervention) group. There is a statistically significant difference between the test and control group at ($P = <0.001$). **Conclusion:** Patient education produced a substantial improvement in patient counselling, understanding of their illness and role of medication and its treatment. Pharmaceutical care services provided by the pharmacist improved quality of life, medication adherence in test subjects. Interventions aimed at improving therapeutic outcomes in bronchial asthma.

Key words: β -agonists, Bronchial asthma, Medication adherence, Pharmaceutical care, Prescribing Pattern, Quality of life.

INTRODUCTION

Asthma is a disease of increasing prevalence that is a result of genetic predisposition and environmental interactions and one of the most common chronic diseases of childhood. It is characterized by recurrent attacks of breathlessness and wheezing, that may vary in severity and frequency from person to person.¹ Asthma is a chronic inflammatory disorder of airways. Asthma is thought to affect 3% of population in most countries.² Asthma is one of the most commonly under diagnosed and untreated disease which further creates substantial burden on individuals and their families.³

Three to five percent of paediatric population in India is affected by asthma where as in adults it ranges from 3-11%.⁴ In this study, an attempt has been made to study general prescribing pattern impact of pharmaceutical care based on therapeutic regimen prescribed, counseling patient on disease condition, medication use, and medication Adherence.⁵ In order to improve patient's health, pharmaceutical care has to be implemented by clinical pharmacist which includes activities like monitoring patient's symptoms, counselling patients about their medications, helping to resolve

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Address for correspondence:

Mr. V. Bhavan Kumar,
Department of Pharmacy Practice, Rajah Muttiah Medical College and Hospital (RMMCH), Chidambaram-608001, India
Phone no :9042915174
E-mail :bhavan.hari@gmail.com



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Drug-related problems. This study was performed to show the impact of pharmaceutical care plan in the patients with asthma. Bronchial asthma has an appropriate focus of pharmaceutical care because it is a chronic disease which requires ongoing therapeutic monitoring. The acute exacerbations of asthma leading to morbidity, increased cost and death often preventable.^{6,7}

Adherence is a primary determiner of the effectiveness of treatment because poor adherence attenuates optimum clinical benefit. Good adherence improves the effectiveness of interventions aimed at promoting healthy lifestyles, such as diet modification, increased physical activity, and of the pharmacological-based risk-reduction interventions. It also affects secondary prevention and disease treatment interventions.⁸

This study aims at current prescribing pattern of asthmatic medications in patients below 12 years and the role of pharmacists in improving patient's health.

MATERIALS AND METHODS

The study was a non-invasive, observational, prospective, cohort study carried out over 6 month period incorporating both descriptive and inferential analyses. The study was approved by the Institutional Human Ethics Committee & Informed Consent Form was obtained from the eligible patients. Patients were selected on the basis of inclusion criteria and exclusion criteria.

Patients of age group below 12 years who were prescribed with at least one anti-asthmatic drug, Patients who were diagnosed with bronchial asthma and under prescription are included in this study. Patients who were not willing to cooperate, Patients who were having other respiratory problems, cardiac problems are excluded from this study.

The patients were further classified into 3 age groups 0-4, 5-8, and 9-12 years (as shown in Table 1). Convenient sampling was used to recruit all eligible patients a validated data collection form was used to collect data from the patients. The data collection form provides the information regarding the demographic details of the patient which includes age, sex, past history, family history, medication history and treatment giving to the patient. Participants were inquired about their understanding while completing the form. Their feedbacks were then used to improvise data collection for their easy understanding. In the present study the prescribing pattern was conducted to evaluate the drug-prescribing trend of anti-asthmatics drugs by physicians in RMMCH (Rajah Muttiah Medical College and Hospital). In this study the categories of drugs, antibiotic prescribing pattern, drug therapy regimens, list of drugs complying with WHO (World Health Organisation),

Table 1: Demographic Characteristics

		n	%
GENDER	Boy	43	70.4
	Girl	18	29.6
	Total	61	100
AGE (in yrs.)	0-4	15	24.6
	5-8	21	34.4
	9-12	25	41.0
	Total	61	100

n= 61 (sample size)

NATIONAL, T.N (Tamil Nadu) essential drug list was analysed by including the number of prescriptions. Finally a cohort 61 prescriptions were screened and results were tabulated according to their percentages and number of prescriptions.

In pharmaceutical care sector quality of life was measured by using the paediatric asthma care givers Quality of life (QoL) questionnaire. Medication adherence was adopted by using Morisky adherence scale and the results are interpreted based on the level of adherence as low, medium and high.⁹ In this present study analysis was carried out by comparing test and control groups. All the 61 patients are divided in to two groups and intake was performed in equal proportion with similar age groups and disease condition. Pharmaceutical care intervention was provided to the test group and results were interpreted, whereas in control group results were interpreted without any intervention during the study period. A statistical test was performed using student 't' test using the statistical package for social sciences version 16 (SPSS Inc, Chicago, IL, USA) for the analysis of data at a significance level of $P < 0.001$. This level of significance is obtained at 60 degrees of freedom, 95% confidence interval. After the completion of study the pharmaceutical care was provided evenly to both test and control group.

RESULTS

Patient Characteristics

A total of 67 patients were approached of whom 61 patients agreed to participate in the study. Out of which 43 (70.4%) are boys and 18 (29.6%) are girls. At the beginning of the study the patients are divided based on intervention into test group and control group (30 controls and 31 tests). Majority of the patients were in the age group of 9-12 years (41%) followed by 5-8 years (34.4%). Climate is the primary cause of bronchial asthma accounts for 55% followed by dust and pollens. Represented in (Figure 1).

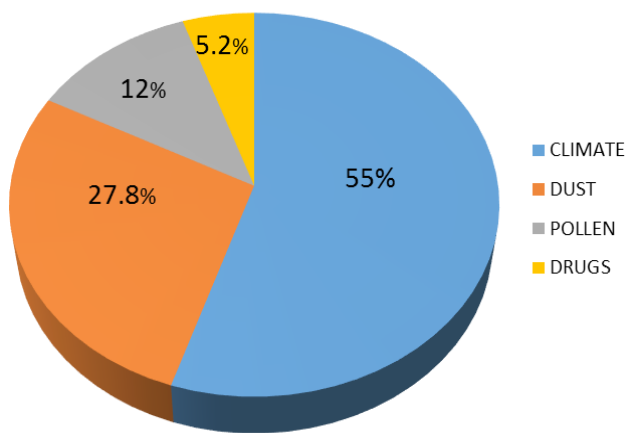


Figure 1: Causes of Asthma

Prescribing pattern

β-agonists (Salbutamol, Ipratropium bromide) accounts for highest number of prescriptions i.e, 51 prescriptions followed by Corticosteroids (Hydrocortisone, Prednisolone, beclomethasone) and methylxanthine (Theophylline), 25 and 23 prescriptions respectively (shown in Table 2). Whereas Anti-Histamines are the least prescribed category drugs. Crystalline penicillin was present in highest number of prescriptions (86.8%). Followed by Amikacin (77%), Gentamycin (73.7%), and Ampicillin (54%). Multiple drug therapy was the most common type of drug therapy regimen prescribed in most of the prescriptions. In this study drugs used in RMMCH were compared to various EDL (Essential drug list) and it was found that 100% of drugs are complied with national EDL (shown in Table 3). List of all anti-asthmatic drugs mentioned in WHO EDL, National EDL, TN EDL and drugs used in RMMCH are tabulated in (Table 4).

Impact of Pharmaceutical Care

The impact of pharmaceutical care among test and control group was measured using various assessments such as (lung function tests, handling of inhalers, Quality of life and medication adherence). FEV (Forced Expiratory Volume) and FVC (Forced Vital Capacity) tests are used to assess the lung function in test and control groups before and after intervention (as shown in Table 5) and their statistical significance differences were measured. Improvement in handling of inhalers in between test and control were tabulated in (Table 6). By using the paediatric asthma care gives quality of life questionnaire mean values are noted in both test and control group before and after the intervention. These mean values are noted in (Table 7). Medication adherence results are noted for follow up periods in test and control groups.

The following tabular column represents the differences in mean values of forced vital capacity and forced expiratory volume₁ in test and control groups before and after the intervention.

DISCUSSION

PATIENT DEMOGRAPHIC CHARECTERISTICS

A total number of 67 patients were enrolled during the study period. Of these, 61 patients completed study. In comparison with earlier studies,^{11,12,14} asthmatic attacks were found to be more common in male than female patients in the present study. Almost 40% of patients were in the age group of 9-12 years. Rest, around 60% were in the 0-8 year's age group. Our findings correlates with the study conducted,¹¹ puerility asthma is the

Category	Name of drugs	No. of prescription
CORTICOSTEROIDS	Hydrocortisone, Prednisolone, Beclomethasone	25
β-AGONIST	Salbutamol, Ipratropium bromide	51
METHYLXANTHINE	Theophylline	23
ANTI HISTAMINES	Epinephrine	13
ANTIBIOTICS	Crystalline penicillin, Amikacin, Amoxicillin.	22
ANTITUSSIVES	Mucolytics, Cough suppressants	24

Total no. of anti-asthmatic drugs				No. of drug belonging to			% of drug belonging to		
IN WHO EDL	IN NATIONAL EDL	IN TN EDL	IN RMMCH	WHO	N EDL	TN EDL	WHO EDL	N EDL	TN EDL
5	4	5	5	3	4	2	60%	100%	40%

Table 4: List of Anti-Asthmatic Drugs in Rmmch, Who Edl, National Edl & Tn Edl

DRUGS LIST IN WHO-EDL	DRUGS LIST IN NATIONAL EDL	DRUGS LIST IN TN-EDL	DRUGS LIST IN RMMCH
BECLOMETASONE Inhalation (aerosol):100 mcg per dose.	IPRATROPIUM BROMIDE Inhalation 20 mcg/metered dose	THEOPHYLLINE & ETOPHYLLINE Anhydrous theophylline 50.6 mg Etophylline 169.4mg	THEOPHYLLINE
BUDESONIDE Inhalation (aerosol):100 mcg; 200 mcg per dose.	SALBUTAMOL Tab 2 mg, 4 mg Syrup 2 mg/5 ml Inhalation 100 mcg/dose	THEOPHYLLINE IP 23 mg	SALBUTAMOL
EPINEPHRINE Inj. 1mg in 1-ml ampoule	BECLOMETHASONE DIPROPIONATE Inhalation: 50mcg, 250mcg/dose.	ETOPHYLLINE IP 77 mg	IPRATROPIUM BROMIDE
IPROTROPIUM BROMIDE Inhalation (aerosol): 20 mcg	HYDROCORTISONE SODIUM SUCCINATE Injection : 100 mcg, 200 mcg, 400 mcg	SALBUTAMOL Nebulizer- 5 mg/ml	BUDESONIDE
SALBUTAMOL Neb: 5 mg; Inj: 50 mg. Inhalation (aerosol):100 mg		SALBUTAMOL SULPHATE Tab I.P 4 mg	

Table 5: Assessment of Lung Function Tests

		FVC	FEV ₁
TEST	BEFORE	3.08±0.27	2.41±0.76
	AFTER	3.39±0.32	2.97±0.82
CONTROL	BEFORE	2.66±0.19	2.39±0.76
	AFTER	2.85±0.29	2.42±0.77

FVC *The difference in the mean values of the two groups (test and control) is greater than would be expected by Chance; there is a statistically significant difference between the input groups (P=< 0.001).t=2.803. * For control group t=0.803 (P=0.425).

FEV₁ *The difference in the mean values of the two groups (test and control) is greater than would be expected by Chance; there is a statistically significant difference between the input groups (P=< 0.008).t=2.743. * For control group t=0.154 (P=0.878).

Table 6: Assessment for Handling of Inhalers

Trained	Correct Users	Incorrect Users	P value
Test	15 (48.3%)	16 (51.6%)	0.121
Control	3 (10%)	27 (90%)	

Significance was found out by comparing the calculating t value with tabulated t value at 95% confidence interval (p=0.016).

Table 7: Assessment of Quality Of Life

	Pre intervention	Post intervention	Significance
Test	45.21 ± 5.83	58.21 ± 7.86	YES
Control	44.73 ± 5.84	48.59 ± 6.36	YES

* The difference in the mean values of the two groups (test and control) is greater than would be expected by Chance; there is a statistically significant difference between the input groups (P=<0.001).t=7.396 * For non-interventional group t=1.844 (P=0.070).

Table 8: Medication Adherence

	FOLLW UP 1			FOLLOW UP 2		
	L	M	H	L	M	H
TEST	2	17	12	0	12	19
CONTROL	7	22	2	9	21	1

L=low, M=medium, H= high.

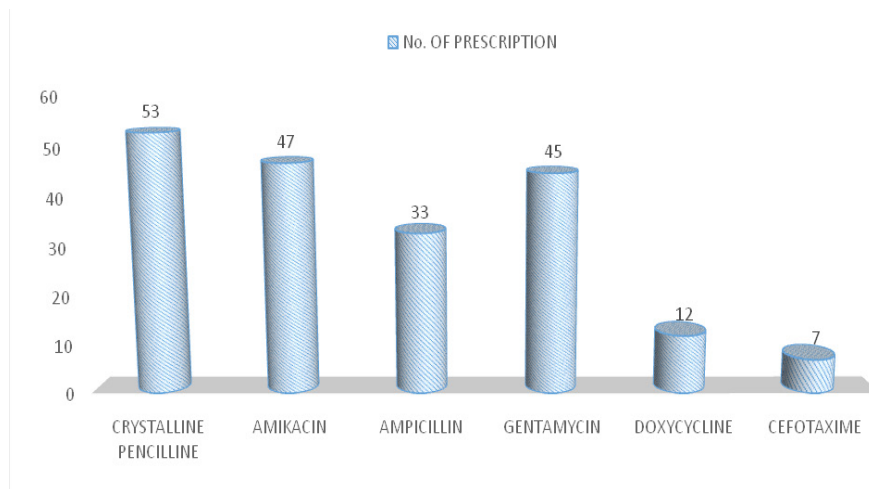


Figure 2: Antibiotics Prescribed

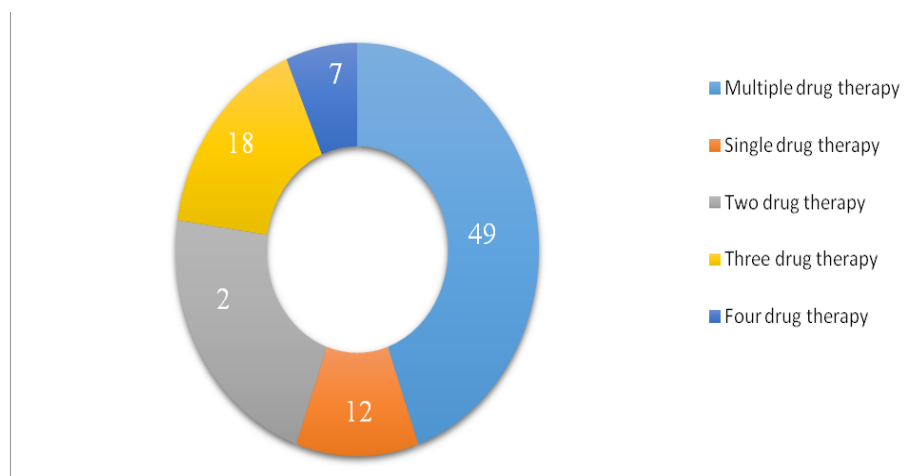


Figure 3: Drug Therapy Regimen

most predominant chronic condition and further study findings shows consistent higher prevalence rates, with ~10% in children. More than the half i.e., 57.3% of patients have moderate asthma, following with mild and severe. This study shows the main cause of asthma is climate which accounts for 55%, dust for 27.8%, and other causes accounts for 22.2% (pollens and drugs).

PRESCRIBING PATTERN

The choice of drug depends on the proper classification of the severity of attack that occurs. In this study, average number of anti-asthmatic drugs prescribed per patient was 3.5.

Multi drug therapy was the most common type of therapy identified in this study, which is consistent with the findings of other studies.¹⁰ It accounts for 80.32% of all

the prescription. Among the 40.98% of prescriptions that had polytherapy, 19.6% of prescription consisted of mono therapy depicted in Figure 3.

Salbutamol (β -agonists) (83.60%) was the most commonly used bronchodilator followed by theophylline (methyl xanthine's) (37.70%). Corticosteroids (hydrocortisone, dexamethasone, and prednisolone) are prescribed in 25 (40.98%) prescriptions.^{10,13,17} Anti-tussives, antibiotics and anti-histamines are prescribed in 24 (39.34%), 22 (36.06%), 13 (21.31%) prescriptions respectively as depicted in Figure 2.

On comparison of drugs used in RMMCH with essential drug lists of WHO, NATIONAL EDL AND TN EDL we found that 60% of anti-asthmatics belong to WHO EDL, 100% to NATIONAL EDL & 40% to TNEDL. This implies that treatment strategies of RMMCH are based on WHO recommendations.

IMPACT OF PHARMACEUTICAL CARE

Controlling Bronchial asthma with minimal adverse effects and maintaining the patient's ability to perform daily activities are the critical measures of treatment outcome. In this study, the outcome of the pharmaceutical care was measured in terms quality of life, assessing inhalation techniques, medication adherence. Serious problems like medication in adherence leads to increased burden on health care system. Thus, pharmaceutical care explicitly shows the pharmacist crucial role in the improvement of patient's health related quality of life, rather than simply providing a product or service. Pharmaceutical care activities are particularly important when caring for patients with chronic disease, where it is estimated that over 50% of patients do not take their medication properly. In the present study, we examined the impact of a pharmaceutical care program implemented to improve outcomes and optimize quality of life in patients with bronchial asthma. In the asthmatics, the intervention group had a better general health, higher activity, and less impact on their daily life, as detected by asthma care givers questionnaire, compared with the control group. Our study indicated that patients are benefited with continual patient's education¹⁵ assessed the effect of patient education on HRQoL (Health Related Quality of Life) in a randomized controlled study on asthma and COPD (Chronic Obstructive Pulmonary Disease) and they observed, after one year follow up, a clear improvement in the intervention group relative to the control group among asthmatics.¹⁶ The intervention group, in the asthmatic patients of our study, had overall positive clinical outcomes. They had improved FEV₁ & FVC, less symptoms, exacerbation, improved medication adherence and better handling of inhalers, compared with the control group. Statistically significant differences between the control and the intervention groups were noted regarding FVC & FEV₁. Statistically significant changes were also observed in the QoL of patients with asthma compared with non interventional group. This difference can be attributed to better understanding of disease and risk factors, thereby avoiding the trigger factors which lead to lower number of attacks and hospital visits.

Improvement in usage of inhaler is observed in interventional group compared to non interventional group when assessed based on the stages involved in inhalation technique.

MEDICATION ADHERENCE

Remarkable improvement in adherence is observed in interventional group after follow-up two (shown in Table 8). This improvement can be attributed for better

understanding of drugs by patient due to patient education. These results suggest that more involvement of pharmacist in patient care yields better therapeutic outcomes.

CONCLUSION

Our study showed that male is more affected with asthma than female. Patients of age group 8 – 12 more affected than any other age groups. B-agonists and corticosteroids are the most commonly prescribed drugs for asthma followed by methylxanthines and anti-tussives. Most of the treatment strategies are adopted from WHO guidelines and WHO EDL. Patient education increased the knowledge about Asthma and importance of self-care, and lifestyle modifications that can lead to better control of the disease among the patients. By the end of our study there was a significant increase in the medication adherence score. It is evident that Patient education produced a significant improvement in quality of life, medication knowledge and the effect in adherence behaviour. By the end of our study there was a significant increase in the mean score of QoL in the test group. At base line all patients had poor knowledge and attitude towards their disease and thus poor QoL. At the end of the study patients of interventional group received extensive education regarding their disease and its management showed greater improvement in treatment outcomes than in patients in control group. Medications and hospitalization charges account for the most part of direct cost can be overcome due to patient's education. Medication adherence results suggest that more involvement of pharmacist in patient care yields better therapeutic outcomes. Pharmacist holds an important role in educating the patient about disease there by avoiding the trigger factors and reducing the hospitalizations. In conclusion, patient counselling aided and had a positive impact on patient's understanding of their illness and the role of medications in its treatment, improved medication adherence, and improved Quality of life for the patients. Moreover, a good professional rapport has been built between the Pharmacist and the Patient.

CONFLICT OF INTEREST

The author has no conflict of interest

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constant inspiration, kind co-operation and great intend to us to fulfill our work in a successful manner.

Highlights of Paper

- Made a clear attempt to show the general prescribing pattern of physicians in bronchial asthmatic paediatric patients.
- Impact of pharmaceutical care was evaluated and shown how significant the impact was.
- Pharmaceutical care is provided and emphasized its importance in pediatric patients.

Author Profile

- **V. Bhavan kumar:** Completed 5 years PHARM D. and presently working as intern in super speciality hospital rajah mutiah medical college and hospital Annamalai University, Tamil nadu. I have 2 review papers in different journals and this is my first research article. I am interested in the fields of clinical research, clinical pharmacy, pharmacovigilance, public health sciences. Having an experience in designing patient's therapeutic plan and providing pharmaceutical care, participating in daily ward rounds, patient counselling, Assessment of drug related problems, measurement of therapeutic outcomes and drug information services in wards like obstetrics and gynaecology, paediatrics, surgery and general medicine..

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