

DOI: <https://dx.doi.org/10.18203/2319-2003.ijbcp20243833>

Original Research Article

Drug prescription pattern in asthma in a tertiary care hospital in South India

Sruthi Sethumadhavan^{1*}, Kala Kesavan Parvathy², Shajahan Purathel Sulaiman³

¹Department of Pharmacology, Sree Balaji Medical College and Hospital Chennai, Tamil Nadu, India

²Department Of Pharmacology, Govt. T.D. Medical College, Alappuzha, Kerala, India

³Department Of Pulmonary Medicine, Govt. T.D. Medical College, Alappuzha, Kerala, India

Received: 07 October 2024

Revised: 12 November 2024

Accepted: 13 November 2024

*Correspondence:

Dr. Sruthi Sethumadhavan,
Email: sruthis93@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Asthma, a chronic inflammatory disorder of the airways, affecting millions of individuals is a global health concern. It necessitates long-term management for optimal outcomes. impacting therapy costs and patient's compliance. This study was done to analyse current prescribing trends in the management of asthma patients. This study examines current asthma treatment trends to enhance patient care and disease outcomes.

Methods: This is an Observational cross-sectional study conducted at Government T. D. medical college, Alappuzha between October 2019 to September 2022. All patients clinically diagnosed with or a previously known case of asthma between 18-60 years of both sex attending the outpatient department of Pulmonary Medicine who gave consent for study were included. Data was collected by interviewing and from the patients OP card using a prestructured proforma. Data collected included patient details, allergy and smoking history, comorbid conditions, drugs prescribed for asthma along with dose, route and frequency of administration, concomitant medications, diagnostic tests if any.

Results: Out of 200 asthma cases, 119 (59.5%) were females. The mean age was 43.95 ± 10.62 years. 21 patients (10.5%) were smokers. 57 (28.5%) patients had an allergic predisposition. Hypertension $n=48$ (24%) was the most common comorbidity among the patients. A mean of 3.05 ± 1.52 drugs per prescription. Out of 609 drugs prescribed, 450 (73.89%) drugs were from the National list of essential medicines (NLEM) and 366 (60.09%) drugs were from the WHO essential list. A combination of LABA with ICS was the most common drug given in 121 (60.5%) patients followed by Glucocorticoids 101 (50.5%) and PDE-inhibitor-Deriphylline 74 (37%) patients. Antibiotics was prescribed in 43 (21.5%) patients. 164 (82%) patients received a combination therapy. Out of the 609 drugs prescribed, 334 (54.8%) were oral followed by inhalational route 264 (43.3%).

Conclusion: Study demonstrates the variability of drug utilization in asthma patients. The rising significance of PPMS (Prescription pattern monitoring studies) stems from heightened marketing of new medications, shifts in prescribing patterns and drug consumption, escalating worries regarding delayed adverse reactions, drug costs, and prescription volumes.

Keywords: Asthma, Prescription pattern monitoring studies, Co-morbidities, WHO essential drug list, NLEM

INTRODUCTION

Asthma presents a significant global health and socioeconomic challenge, impacting millions of people worldwide.¹ It involves inflammation and airway

remodelling, leading to increased sensitivity and constriction of the air passages.² Treatment approach involves giving patients stepwise therapy appropriate for their disease severity. Current GINA (Global initiative for Asthma) guidelines no longer recommend the use of short acting beta agonists (SABA) alone for the treatment of

mild asthma, instead they recommend low dose inhalational corticosteroids (ICS) use as-needed & for maintenance therapy. If symptoms are not adequately controlled with ICS, long-acting beta agonists (LABA) can be added. If symptoms are still not controlled, higher doses of ICS or oral CS and/or alternative controller therapies should be considered.^{3,4} Asthma is a chronic disease, which necessitates long term treatment for an effective management, impacting therapy costs and patient adherence. Inappropriate medication practices, like irrational prescribing, unwarranted multidrug regimens and excessive dosages, reduce effectiveness, increase side effects, and heightens the cost of therapy. Therefore, it is imperative to assess the prescribing pattern of physicians periodically to identify any defects and undertake effective corrective measures.⁵

Physicians should primarily prescribe medications listed in the national list of essential medicines (NLEM). These drugs, defined by the World Health Organization (WHO), meet critical healthcare needs, ensuring availability, quality, affordability, and effectiveness. The WHO's model list guides the creation of national and institutional essential medicine lists, promoting health equity globally. Essential medicines are widely recognized for their cost-effectiveness and significant impact on healthcare.⁶

Prescription pattern monitoring studies (PPMS) focus on understanding drug prescription, dispensing, and administration. They aim to promote rational drug use by ensuring appropriate medication use, preventing abuse, detecting interactions and adverse effects, and educating prescribers and the public. These studies provide insights into drug usage trends, compliance with guidelines, usage of drugs from essential medicine list and use of generic drugs, especially amidst increasing marketing of new drugs, evolving prescription patterns, and concerns regarding adverse effects, drug costs, and prescription volumes.⁷

Hence, this study can illustrate the present-day scenario of asthma patients and the prescribing trends of physicians in managing these patients with co-morbidities and complications in a tertiary care centre. It will also provide an outline for management strategies and will influence the healthcare decision making. To study the medication prescribing patterns in patients with asthma aged 18-60 years attending the outpatient department of Pulmonary Medicine over a period of 1 year.

METHODS

Study type

This was observational cross-sectional study.

Study place

The study was conducted at Government T. D. medical college, Alappuzha, Kerala, India.

Study duration

The period of study was between October 2019 to September 2022.

Ethical approval

The study was initiated after getting approval from Institutional Ethics Committee No- 83/2019.

Inclusion criteria

All patients clinically diagnosed with or a previously known case of asthma between 18-60 years of both sex attending the outpatient department of pulmonary medicine who gave consent for study were included.

Exclusion criteria

Patients with asthma- chronic obstructive pulmonary disease overlap & terminally ill patients were excluded. Data was collected by interviewing, and from the patients OP card using a restructured proforma.

Data collection

Data collected included patient details, allergy and smoking history, comorbid conditions, drugs prescribed for asthma along with the route of administration, concomitant medications, diagnostic tests if any.

Statistical analysis

Data was tabulated using Microsoft Excel and presented with the help of descriptive statistics using Epiinfo 7 software.

RESULTS

Out of 200 asthma cases, 119 (59.5%) were females & 81 (40.5%) were males. Female to male ratio was 1.47:1. The mean age was 43.95 ± 10.62 years with minimum age being 18 years and maximum being 60 years. The age group 33-46 years accounted for the highest number of cases $n=91$ (45.5%) followed by age group 47-60 years $n=76$ (38%) and 18-30 years $n=33$ (16.5%). (Table 1) Out of 200 patients, 21 (10.5%) were smokers.

57 (28.5%) patients had an allergic predisposition. 48 patients (24%) had hypertension, 43 (21.5%) had diabetes mellitus, 26 (13%) had dyslipidemia, 18 (9%) had hypothyroidism, 14 (7%) coronary artery disease and 5 (2.5%) had a history of tuberculosis. 42 (21%) had an associated respiratory tract infection (Figure 1).

Total 609 drugs were prescribed in 200 prescriptions. Minimum number of drugs prescribed was 1 and maximum was 8 per prescription with a mean of 3.05 ± 1.52 drugs per prescription and median 3 (Figure 2). Out of the 609 drugs prescribed, 334 (54.84%) were oral. 264 (43.34%) drugs

were of the inhalational route and 11 (1.80%) drugs were administered intravenously. (Figure 3) A combination of LABA with ICS was the most common drug given in 121 (60.5%) patients. In this MDI Formoterol+Budesonide combination was used in 106 (53%) patients and MDI Salmeterol+Fluticasone combination was prescribed in 15 (7.5%) patients.

3Glucocorticoids were given in 101 (50.5%) patients. 67 (33.5%) patients were prescribed MDI Budesonide, 23 (11.5%) patients were prescribed T. prednisolone, and 9 (4.5%) patients received Inj. hydrocortisone. 2 (1%) patients received both oral as well as an intravenous steroid injection (Figure 5).

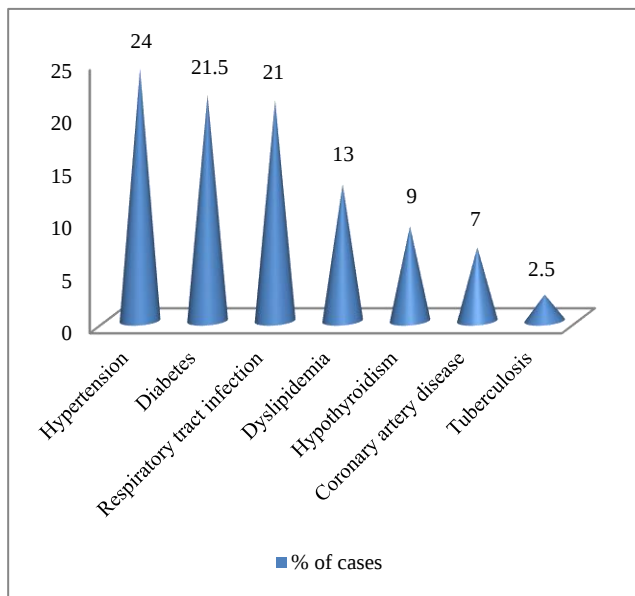


Figure 1: Distribution of co- morbidities.

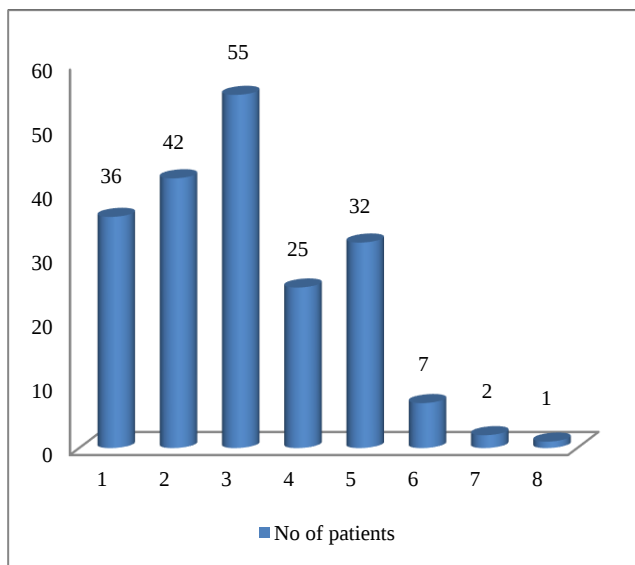


Figure 2: Distribution of number of drugs per prescription (X-axis).

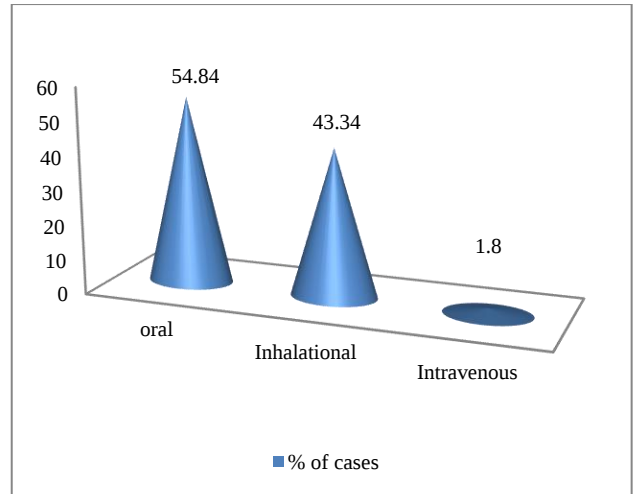


Figure 3: Route of administration.

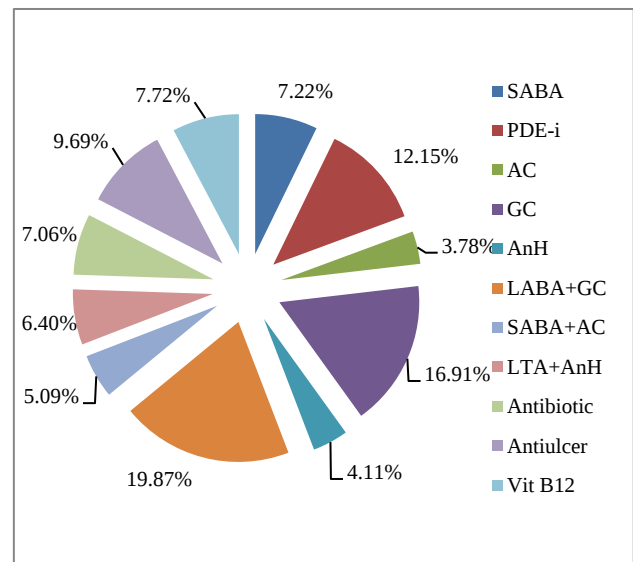


Figure 4: Distribution of drugs.

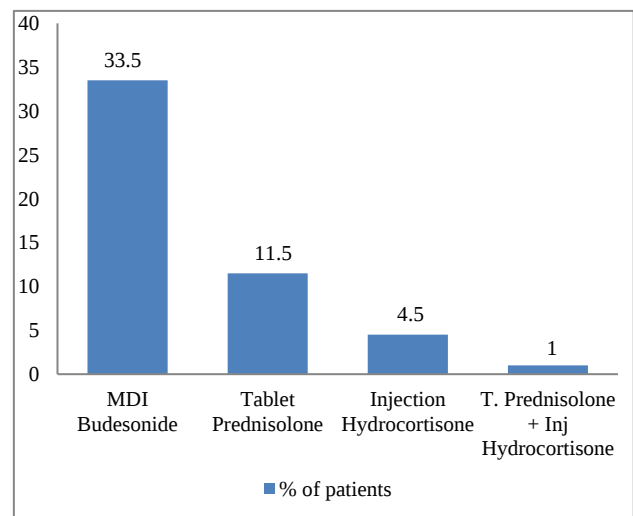


Figure 5: Pattern of steroid use among patients.

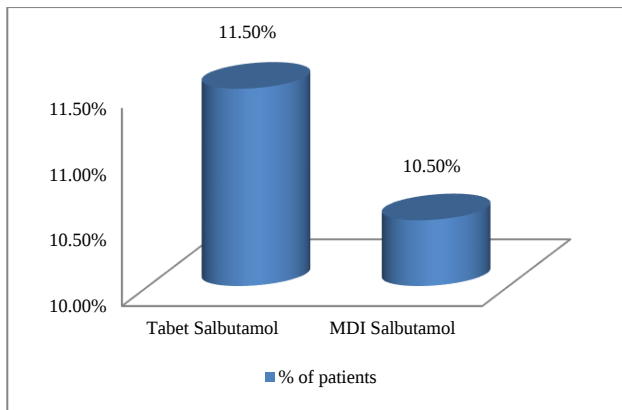


Figure 6: Pattern of SABA use among patients.

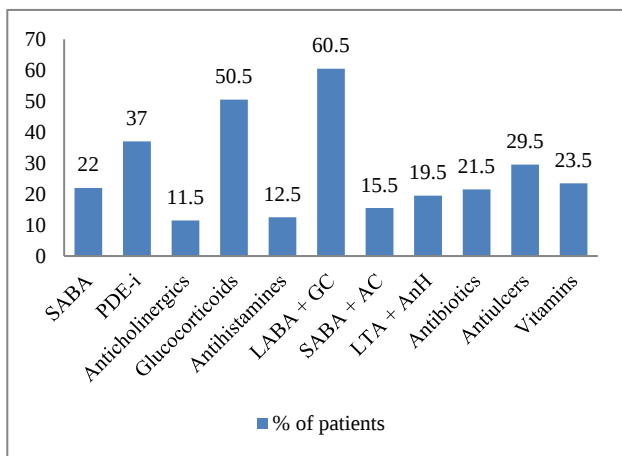


Figure 7: Distribution of patients receiving drugs.

PDE-inhibitor-deriphylline was prescribed in 74 (37%) patients SABA was prescribed in 44 (22%) patients from which 23 (11.5%) were prescribed tablet salbutamol and 21 (10.5%) were prescribed MDI salbutamol. Fixed dose combination of SABA with anticholinergics (AC) (Ipratropium+Salbutamol) was prescribed in 31 (15.5%) patients. (Figure 6) Anticholinergic MDI Tiotropium bromide was prescribed in 23 (11.5%) patients. FDC of leukotriene antagonist with antihistamine (Montelukast+Cetirizine) was prescribed to 39 (19.5%) patients whereas antihistamine was separately prescribed in 25 (12.5%) patients. Antibiotics was prescribed in 43 (21.5%) patients.

Table 1: Age and gender distribution of patients.

Parameters	N (%)
Gender	
Females	119 (59.5)
Males	81 (40.5)
Age (in years)	
18-32	33 (16.5)
33-46	91 (45.5)
47-60	76 (38)
Total	200 (100)

Table 2: Pattern of use of drugs.

Drugs	No. of prescriptions	% out of total drugs prescribed (n=609)
SABA		
T. Salbutamol	23	3.78
MDI Salbutamol	21	3.45
Total	44	7.22
PDE-i		
T.Etofylline+Theophylline	74	12.15
Anticholinergics		
MDI Tiotropium bromide	23	3.78
Glucocorticoids		
MDI Budesonide	67	11
T. Prednisolone	23	3.78
Inj Hydrocortisone	9	1.48
T. Prednisolone+Inj Hydrocortisone	2	0.33
Total	103	16.91
Antihistamines		
T. Cetirizine	25	4.11
LABA+GC		
MDI Formoterol+Budesonide	106	17.41
MDI Salmeterol+Fluticasone	15	2.46
Total	121	19.87
SABA+AC		
MDI Ipratropium+Salbutamol	31	5.09
LTA+AnH		
T. Montelukast +Cetirizine	39	6.40
Antibiotics		
T. Azithromycin	24	3.94
T.Amoxicillin+Clavulanic acid	17	2.79
T. Ciprofloxacin	2	0.33
Total	43	7.06
Antiulcer		
Pantoprazole	36	5.91
Omeprazole	23	3.78
Total	59	9.69
Vitamins		
T. Vit B12	47	7.72

Among them T. Azithromycin 24 (12%) was most commonly used followed by T. Amoxicillin+Clavulanic acid 17 (8.5%) and T. Ciprofloxacin was given in 2 (1%) patients. Anti-ulcers were given in 59 (29.5%) patients. Pantoprazole was the most preferred PPI given in 36 (18%) patients and omeprazole in 23 (11.5%) patients. Vitamin

B12 was prescribed to 47 (23.5%) patients. Monotherapy was used in 36 (18%) patients and 164 (82%) patients received a combination therapy. LABA+ICS OR ICS alone were most commonly used as monotherapy. Out of 609 drugs prescribed, 450 (73.89%) drugs were from the National list of essential medicines and 366 (60.09%) drugs were from the WHO essential list (Table 3).

Table 3: Drug therapy regimen in patients and Distribution of drugs from NLEM and WHO essential list.

Regimen	N (%)
Monotherapy	36 (18)
Combination therapy	164 (82)
Total (patients)	200
Distribution of drugs	
NLEM	450 (73.89)
WHO essential list	366 (60.09)

DISCUSSION

In our study, out of 200 asthma cases, majority were females. This was similar to the results in a study by Nitant Trivedi et al.⁸ Epidemiological studies have shown that the prevalence of asthma is higher among females than males. The fluctuations in sex hormones are believed to influence respiratory health, potentially leading to worsened asthma symptoms in women. Nonetheless, the exact relationships between these elements are not fully understood.^{9,10}

10.5% smokers were identified in our study. Irrespective of whether there is a causative association, smoking exacerbates asthma symptoms and results in faster decline in lung function, reduced response to treatments, increased healthcare costs, and diminished quality of life.¹¹

In our study only 28.5% had a history of allergy to dust, pollen, food, cold weather, etc. Study by George et al, revealed the major precipitating factors for asthma were allergies (75%), followed by infections (18%). Numerous studies have indicated significant associations between sensitization to airborne allergens and asthma.¹²

In our study hypertension was the most common comorbidity, mirroring findings reported by Nitant Trivedi.⁸ Individuals with asthma are at a heightened risk of developing hypertension, which, in turn, is linked to the increased severity of asthma symptoms. Factors contributing to the development of hypertension in asthma patients include reduced lung function, systemic inflammation, disrupted regulation of smooth muscle tone, vascular remodelling, adverse effects of therapy, and genetic predispositions.^{13,14}

In our study most of the drugs prescribed were oral followed by inhalational route. The results are comparable to other studies by Karki et al and Rafeeq et al.^{15,16} Inhalation route is favored for asthma treatment as it allows

direct drug delivery into the airways. This enables the attainment of high concentrations of the drug locally while minimizing the risk for systemic side effects, often permitting lower doses to be used.¹⁷

In our study a combination of LABA with ICS was the most prescribed medication which was given in 60.5% of patients. This is in contrast to a study by Garje et al, where this combination was used only in 39% of the prescriptions.¹⁸ In comparison to using ICS alone as maintenance therapy, the use of ICS/LABAs has been shown to reduce the likelihood of severe exacerbations, increase the proportion of symptom-free days in patients with persistent asthma, enhance quality of life, reduce the necessity for short acting reliever medications, and improve the lung function.^{19,20}

Coming to the pattern of use of steroids alone (not as an FDC with beta agonists) in our study, steroids were used in more than half of the total prescriptions, whereas in another study by Jayadeva et al, corticosteroids were depicted in all 100 prescriptions.²¹ Corticosteroids, inhaled or systemic, are the first-line treatment for children and adults with persistent symptoms and is associated with significant improvements in lung function due to their anti-inflammatory actions and ability to inhibit the remodelling process.²²

In our study Deriphyllin was prescribed in 37% patients whereas it was used in 53% of prescriptions in a study by Jayadeva et al. Methylxanthines have various beneficial effects like bronchodilation, improved mucociliary transport and immunomodulatory properties.^{21,23}

In our study, SABA was prescribed both in the form of tablet and MDI. Though SABA provides rapid relief of symptoms, they don't tackle the root inflammatory cause and fail to shield patients from exacerbations. Even with effective symptom management, patients solely on SABA therapy face increased morbidity. Consequently, present guidelines advocate for combining inhaled corticosteroids (ICS) with quick-relief medication during acute exacerbations.²⁴

The combination of inhaled AC and SABA agents potentially improves lung function due to their distinct mechanisms of action aimed at reducing airway bronchospasm. While SABA agents are known for their potent bronchodilatory impact on airway smooth muscle, AC agents act to reduce airway secretions, and possess milder bronchodilating action.²⁵

Antibiotics were given in 21.5% patients. This is comparable to a study by Garje et al, in which encounter with antibiotics was seen in 19% cases.¹⁸ Indiscreet use of antibiotics should be avoided unless an underlying infection is suspected to avoid antimicrobial resistance.

All these findings suggest polypharmacy in many patients. Nonetheless, due to the intricate features of asthma, its

chronicity, the necessity to manage acute exacerbations, and the requirement for maintenance therapy to avert future attacks, polypharmacy becomes inevitable.²⁶

73.9% drugs were from the National list of essential medicines and 60.1% drugs were from the WHO essential list, whereas the study by Saji et al analysed that 100% of the drugs prescribed complied with the WHO essential list as well as with the NLEM.²⁷ This is essential to reduce the overall cost and make the drug easily available to the public. Thus, this study identifies the prescription pattern of patients diagnosed with asthma and co-morbidities associated with the disease.

There are some limitations of the study like results cannot be generalized. Data from multiple centres need to be collected to get the exact picture of prescribing pattern in general. It cannot be guaranteed that the prescription characteristics of a particular medication for a given patient remains unchanged over the course of follow-up of these patients.

CONCLUSION

Asthma, once diagnosed, demands ongoing treatment for life. Patients often receive a combination of drugs through various routes, necessitating careful selection to maximize benefits and minimize side effects.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Kudo M, Ishigatsubo Y, Aoki I. Pathology of asthma. *Front Microbio*. 2013;4:1–16.
- Mcdonald VM, Gibson PG, Maltby S, King GRG, James ALAN, et al; Seeking innovative solutions in severe asthma. *Respirol*. 2016;22(1):19-20
- Longo, Fauci, Kasper, Hauser, Jameson, Loscalzo; Harrison's manual of Medicine. 18th edi. McGraw Hill; 2012: 907-910.
- Global initiative for asthma. Global strategy for asthma management and prevention. 2020. Available at: www.ginasthma.org. Accessed on 15 July 2024.
- Pandey A, Tripathi P, Pandey R. Prescription pattern in asthma therapy at Gorakhpur hospitals. *Lung India*. 2010;27(1):8–10.
- Kar SS, Pradhan HS, Mohanta GP. Concept of essential medicines and rational use in public health. *Indian J Community Med*. 2010;35(1):10–3.
- Jain S, Jain P, Moghe V, Seth V, Upadhyaya P, Abhijit K, et al. A systematic review of prescription pattern monitoring studies and their effectiveness in promoting rational use of medicines. *Persp Clin Res*. 2015;6(2):86.
- Trivedi N, Acharya HR, Barvaliya MJ, Tripathi CB. Prescribing pattern in patients of asthma visiting outpatient departments of a tertiary care hospital: a cross-sectional, observational study. *Int J Basic Clin Pharmacol*. 2017;6(3):587.
- Baldaçara RP de C, Silva I. Association between asthma and female sex hormones. *Sao Paulo Med J*. 2017;135(1):4–14.
- Macsali F, Real FG, Omenaas ER, Bjorge L, Janson C, Franklin K, et al. Oral contraception, body mass index, and asthma: A cross-sectional Nordic-Baltic population survey. *J All Clin Immunol*. 2009;123(2):391–7.
- Tiotiu A, Ioan I, Wirth N, Romero-Fernandez R, González-Barcala FJ. The impact of tobacco smoking on adult asthma outcomes. *Int J Environ Res & Public Heal*. 2021;18(3):1–12.
- George M, Joseph L, Mohan N. Evaluation of drug prescribing pattern in patients with bronchial asthma. *Europ J Pharm Med Res*. 2017;4(9):702-6.
- Ferguson S, Teodorescu MC, Gangnon RE, Peterson AG, Consens FB, Chervin RD, et al. Factors associated with systemic hypertension in asthma. *Lung*. 2014;192(5):675–83.
- Bragina EY, Goncharova IA, Garaeva AF, Nemerov E V., Babovskaya AA, Karpov AB, et al. Molecular relationships between bronchial asthma and hypertension as comorbid diseases. *J Integr Bioinform*. 2018;15(4):53-9.
- Sharad Karki, Ipseeta Ray Mohanty, Pradip V. Potdar, YA Deshmukh, RC Shah, BR Pokhrel. Assessment of prescribing patterns of drugs used in adult asthma patients at a tertiary care hospital. *Int J Curr Res Med Sci*. 2017;3(6):169–75.
- Rafeeq MM, Murad HAS. Evaluation of drug utilization pattern for patients of bronchial asthma in a government hospital of Saudi Arabia. *Niger J Clin Pract*. 2017;20(9):1098–105.
- Gregoriano C, Dieterle T, Breitenstein AL, Dürr S, Baum A, Maier S, et al. Use and inhalation technique of inhaled medication in patients with asthma and COPD: Data from a randomized controlled trial. *Respir Res*. 2018;1:19.
- Garje YA, Kumar SR, Kumar R, Deshmukh Y, Patra V, Suman et al. Prescribing patterns and pharmacoeconomic analysis of drugs used in pediatric asthma patients at tertiary care hospital. *World J Pharma Pharma Sci*. 2014;3(6):1448-65.
- Devillier P, Humbert M, Boye A, Zachgo W, Jacques L, Nunn C, et al. Efficacy and safety of once-daily fluticasone furoate/vilanterol (FF/VI) versus twice-daily inhaled corticosteroids/long-acting β_2 -agonists (ICS/LABA) in patients with uncontrolled asthma: An open-label, randomized, controlled trial. *Resp Med*. 2018;141:111–20.
- Jenkins CR, Bateman ED, Sears MR, O'Byrne PM. What have we learnt about asthma control from trials of budesonide/formoterol as maintenance and reliever? *Respirology*; 2020;25:804–15.
- Jayadeva BT, Panchaksharimath P. A retrospective study on drug utilization in patients with acute exacerbation of bronchial asthma in adults at a tertiary

- teaching hospital in Bengaluru. *Egypt J Chest Dis Tuberc*. 2016;65(1):19–22.
22. Ramadan AA, Gaffin JM, Israel E, Phipatanakul W. Asthma and corticosteroid responses in childhood and adult asthma. *Clin Chest Med*. 2019;2:163–77.
23. Maselli DJ, Peters JI. Medication regimens for managing acute asthma. *Respiratory Care*. 2018;63(6):783–96.
24. Kaplan A, Mitchell PD, Cave AJ, Gagnon R, Foran V, Ellis AK. Effective Asthma Management: Is It Time to Let the AIR out of SABA? *J Clin Med*. 2020;9(4):921.
25. Kirkland SW, Vandenberghe C, Voaklander B, Nikel T, Campbell S, Rowe BH. Combined inhaled beta-agonist and anticholinergic agents for emergency management in adults with asthma. *Cochr Data Sys Rev*. 2017;6(1):465060.
26. Lopez-Rodriguez JA, Rogero-Blanco E, Aza-Pascual-Salcedo M, Lopez-Verde F, Pico-Soler V, Leiva-Fernandez F, et al. Potentially inappropriate prescriptions according to explicit and implicit criteria in patients with multimorbidity and polypharmacy. MULTIPAP: A cross-sectional study. *PLoS One*. 2020;(15):1–20.
27. Saji M, Elizabeth Raju L, Thomas SP, Manna PK, Ramesh S, Author C, et al. Study of drug prescribing and use pattern in paediatric bronchial asthma patients. *Int J Adv Res*. 2017;5(7):691–8.

Cite this article as: Sethumadhavan S, Parvathy KK, Sulaiman SP. Drug prescription pattern in asthma in a tertiary care hospital in South India. *Int J Basic Clin Pharmacol* 2025;14:38-44.