INTERNATIONAL JOURNAL OF HEALTH & MEDICAL RESEARCH

ISSN(print): 2833-213X, ISSN(online): 2833-2148

Volume 04 Issue 05 May 2025

DOI: 10.58806/ijhmr.2025.v4i5n07

Page No. 281-294

Retrospective Cross-Sectional Evaluation of Asthmatreatment Strategies and Outcomes at Yekatit 12 Hospital (2022).

Amanu Zewdie Belta¹**, Rafia Hussain², Abel Melaku Tefera³, Mekurab Kebede Mergia⁴, Alazar Molla Tesfaye⁵, Yonas Zewdu Milikit³, Biruk Dula Goraga⁵, Samrawit Teame Gebremariam¹, Mickiyas Ayalew Mekonnen³, Arsema kinfemicheal seifu¹, Eunice Borkor Bortequaye⁶, Adonias Ager Sinshaw⁵, Yabets Alemu Mamo⁷, Fiyameta Abraham Fissehatsion^{1*}, Bruktawit Ketema Belayneh^{1*}

¹Department of Medicine, Yekatit 12 Hospital Medical College, Addis Ababa, Ethiopia

²Department of Medicine, Rawalpindi Medical University, Rawalpindi, Pakistan

³Department of Medicine, University of Gondar, College of Medicine and Health Science

⁴Department of Medicine, Jimma University, Oromia Region, Ethiopia

⁵Department of Medicine, Addis Ababa University, College of Medicine and Health Science, Addis Ababa, Ethiopia

⁶University for Development Studies, School of Medicine (UDS-Som), Tamale, Ghana

⁷Department of Medicine, Hawassa University, School of Medicine and Health Science

ABSTRACT

Background: Asthma is a worldwide problem; about 300 million people are estimated to have the condition. It is still one of the significant health problems worldwide, particularly increasing in developing countries. Although new drugs and evidence-based guidelines have been developed in recent years, there is still a challenge in reducing asthma morbidity and mortality, and Asthma continues to be under-treated.

Objective: To evaluate the treatment strategies and clinical outcomes among asthmatic patients at Yekatit 12 Hospital in 2022.

Method: A retrospective cross-sectional study was conducted using the medical records of asthmatic patients who attended Yekatite 12 Hospital Medical College in 2022. The study covered the past two years (January 1, 2020 – January 1, 2022 G.C.). Systematic random sampling was employed to select the study subjects. A total of 210 patient records were reviewed.

Result: Of the 210 asthmatic patients studied, 118 (56.2%) had poorly controlled asthma, while the remaining 92 (43.8%) had wellcontrolled asthma. Among anti-asthmatic drugs, the most prescribed medication was short-acting Beta2-agonists, accounting for 63.80% of the total prescribed anti-asthma drugs—salbutamol puff (34.09%) and oral salbutamol (27.91%). Inhaled corticosteroids accounted for only 15.58%. The most effective anti-asthmatic drug combination was a short-acting Beta2-agonist plus Prednisolone, which was prescribed to 39.57% of asthmatic patients. Overall, 56.2% of asthma patients had poorly controlled asthma, while the rest had well-controlled asthma. There is a statistically significant association between social drug use and treatment outcomes (pvalue = 0.031). According to GINA guidelines, the recommended treatment option for children older than six, adolescents, and adults is a combination of a low-dose inhaled corticosteroid (ICS) with an inhaled long-acting Beta2-agonist (LABA), either as a combination inhaler or as separate components.

Conclusion and recommendation: Short-acting β 2-agonists were the most frequently prescribed anti-asthmatic medications. The most common combination therapy involved short-acting β 2-agonists and Prednisolone. This study highlights that, despite the availability of effective asthma treatments, asthma control among the patients studied remains inadequate and does not meet standard guideline recommendations, including those outlined in the Ethiopian national guidelines. A considerable proportion of patients exhibited poor asthma control. Furthermore, a significant association was observed between treatment outcomes and the use of social drugs.

KEYWORDS: Asthma, Inhaled corticosteroids, Treatment outcome, Comorbidities.

1. INTRODUCTION

1.1 Background Information

Asthma is defined by the Global Initiative for Asthma Management and Prevention (GINA) as a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. Chronic inflammation is associated with airway hyper

responsiveness, which leads to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes are usually associated with widespread but variable airflow obstruction within the lung that is often reversible spontaneously or with treatment. However, the diagnosis of Asthma is, in most cases, clinical. One of the symptoms of wheezing, coughing, chest tightness, and breathlessness with variable airway obstruction is usually sufficient to diagnose Asthma. The specificity of these symptoms and signs is low because they occur in many other conditions. [1]

Asthma is one of the leading chronic diseases in the world, with about 300 million people estimated to have the condition. It is still one of the significant health problems worldwide, particularly increasing in developing countries. Although new drugs and evidencebased guidelines have been developed in recent years, there is still a challenge in reducing asthma morbidity and mortality, and Asthma continues to be under-treated. The morbidity remains high, with an estimated Disability Adjusted Life Presence of more years lost (DALYS) of 15 million/year and Years of Life lost to disease (YLD) of 2.2%. [2]

The variable expression of Asthma among patients may be challenging to recognize. Variations in disease may be expressed in terms of both functional symptoms and patients' responses to therapy. These differences are observed even among patients with apparently similar severity of disease. Individual patients also respond in various ways to different classes of medications for Asthma, including inhaled corticosteroids, leukotriene modifiers, and beta-adrenergic agonists. Because of the inherent variability in responses to therapy, many patients remain symptomatic despite close adherence to National Asthma Education and Prevention Program (NAEPP) guidelines. [3]

Inter-country prevalence data are limited to the International Study of Asthma and Allergies in Childhood (ISAAC) in which seven African countries participated (English-speaking regions: Ethiopia 9.1%, Kenya 15.8%, Nigeria 13.0%, and South Africa 20.3%; and French-speaking regions: Algeria 8.7%, Morocco 10.4%, and Tunisia 11.9%). Symptom rates are lower than in industrialized countries, while only South Africa approaches rates found in the UK. Rural African regions always showed much lower asthma prevalence rates than urban areas. [4]

Asthma prevalence in eastern Africa is estimated at 4.4%, and most of the asthma medication prescribers do not follow asthma management guidelines in many Low and medium-income countries. In Ethiopia, the prevalence of Asthma is 9.1% as per PLOS Medicine asthma in Africa. In Jimma, it is around 3.9% for those living within 150 meters of surface road and 3..7% for those living more than 150 meters away, slightly less than Addis Ababa (11.4%). [5, 6, 7]

Asthma medication, if used appropriately, leads to reduced asthma morbidity and mortality. International asthma management guidelines recommend that patients initially diagnosed with Asthma receive short-acting beta₂ agonists (SABA), preferably by inhalation, combined with inhaled steroids. If a poor response is noted, the patient should be prescribed a long-acting beta₂ agonist (LABA) combined with an inhaled steroid. Other add-on medications may include leukotriene receptor antagonists, theophyllines or slow-release beta₂ agonist tablets During exacerbations, patients should receive systemic steroids, nebulizer SABA, and oxygen until they are stable. Then, they should be controlled with inhaled beta-agonists and steroids. [2]

1.2 Statement of the Problem

The Global Initiative for Asthma (GINA) guideline and statistics released by the World Health Organization (WHO) indicate that the prevalence of Asthma is increasing worldwide. It is estimated that about 5% of the adult population and 10-15% of children in the world have Asthma, and most of them are undertreated and with poorly Controlled Asthma. The International Survey of Asthma and Allergy in Childhood (ISAAC) report showed that asthma prevalence was 9% among African schoolchildren aged 13-15. [8] Asthma is a significant public health problem worldwide because of its prevalence; its recognition is inadequate pharmacotherapy and self-management by the patient. There is evidence to suggest the denial of having a chronic condition, poor knowledge of the disease process, medication use and poor self-management are frequent reasons for increased morbidity in Asthma. These issues are particularly relevant regarding primary care, which manages most asthma cases. Moreover, the problem of not managing Asthma in the community according to well-established standard treatment (STG) with inhalation therapy and self-management programs in developing countries is more worrisome. [9]

The global burden of Asthma appears to be related to poor asthma control, which is associated with more frequent asthma symptomatology and bronchodilator use, worse pulmonary function, greater emergency health service utilization, and greater functional impairment. In Canada, Asthma remains poorly controlled in nearly 60% of patients, which places an excess burden on the healthcare system and accounts for between 250-300 deaths per year. Global asthma prevention. [4]

Different approaches have been proposed to deal with this problem. WHO promulgates guidelines for chronic disease management, including Asthma, and the development of questionnaire tools to measure asthma control in clinical settings? One such tool is the asthma control test (ACT), which is based on a 5 5-item survey that assesses interference with activity, shortness of breath, nocturnal symptoms, rescue medication use and self-rating asthma symptoms. [3]

Regardless of these interventions, Asthma is poorly controlled worldwide, particularly in developing countries. The control of asthma symptoms is a realistic goal, and studies have shown that this can be achieved in most asthma patients, leading to a higher

quality of life. Despite this, the control of Asthma is generally poor. The Asthma Insights and Reality in Europe study reported the persistence of daytime symptoms of up to 46% among asthmatics under treatment. [3]

1.3 significance of the study

Asthma is a global issue; most patients' symptoms are poorly controlled. Even though there is data worldwide, there is little literature on Asthma in Ethiopia.

Therefore, this study aims to assess asthma treatment and outcomes among asthmatic patients in DDH, which will pave the way to tackle the problem of irrational use of asthma drugs.

The extent and consequences of anti-asthmatic irrational use occur worldwide. Still, they are more common in developing countries like Africa and Ethiopia, where regulation guidelines, professionals, drug information diagnostic facilities and other health care systems are deficient. Retrospective studies will be a way to decrease such problems.

All anti-asthmatic drugs are not available, many patients can't afford money to buy all prescribed medicines, and many health cares do not have enough knowledge to prescribe appropriate anti-asthmatic drugs depending on patients' characteristics.

This study will help to understand anti-asthmatic prescription patterns and whether symptoms are controlled or poorly controlled. It will also assess whether asthma drug prescriptions conform to GINA and Ethiopia's treatment guidelines.

The findings of this study will help policymakers and health planners design strategies to promote asthma symptom control.

The information identified by this study may also serve as secondary data for subsequent research on asthma treatment.

2. LITERATURE REVIEW

Asthma is still a significant health problem worldwide, particularly in developing countries. Although new drugs and evidencebased guidelines have been developed in recent years, there has been no substantial change in asthma morbidity and mortality, and it continues to be under-treated. [10]

In Canada, among 6254 asthma patients age 65 or older who were hospitalized for Asthma, 2495 (40%) did not receive a prescription for inhaled corticosteroid therapy, which is the mainstay of asthma control according to NHI guidelines after follow-up of 90 days post-discharge. [11]

In the United States, 22% of acute Asthma was treated with an antibiotic. Current guidelines do not recommend an antibiotic for Asthma unless there is evidence of bacterial infection. A systematic review evaluating the efficacy of antibiotics in acute Asthma failed to show its benefits. A lack of knowledge concerning asthma management guidelines drives the high antibiotic prescription in these settings. Clinicians interpret the cough the patients present with as a bacterial infection and prescribe an antibiotic. [12]

A double-blinded clinical trial conducted at the University of Ferra in Italy compared beclomethasone – formoterol maintenance therapy plus as-needed salbutamol and beclomethasone – formoterol as both maintenance and as-needed treatment. Of 326 severe exacerbations reported by 251 patients during the study, 99 and 152 patients had at least one exacerbation during the 48 weeks in the as-needed beclomethasone –formoterol and as-needed salbutamol, respectively. Reliever treatment significantly increased the time to first exacerbation by 75 days (209 vs. 134 days) when beclomethasone–formoterol was used as required therapy.[13]

In England the patients with persistent, moderate-to-severe asthma (blood eosinophil count \geq 300 cells/µL or a sputum eosinophil level \geq 3%) who used medium- to high-dose ICSs (tapered and discontinued over weeks 6–9) and LABAs (continued until week 4) received subcutaneous dupilumab 300mg (n=52) or placebo (n=52) once weekly. Compared with placebo, dupilumab was associated with a significantly lower asthma exacerbation rate (6% vs. 44%]), significant improvements in most lung function and asthma control measures, and reductions in biomarkers associated with Th2-driven inflammation, but more injection-site reactions, nasopharyngitis, nausea and headache.[14]

A clinical trial at the University of Delhi in India randomly selected four asthmatic patients and identified anti-asthmatic prescribing patterns. Patient A was prescribed salbutamol, Prednisolone and hydrocortisone. Patient B was prescribed salbutamol, aminophylline, Prednisolone and beclomethasone. The other patient, C, was prescribed only salbutamol. Patient D takes four anti-asthmatic medications (salbutamol, aminophylline, Prednisolone and hydrocortisone). This study illustrates that salbutamol is the most prescribed drug for asthmatic patients, and beclomethasone is the second most prescribed one. [15]

Asthma control research done in South Africa reveals that among 1276 asthmatic patients, 855(67%) were well controlled, and the others were poorly controlled. This study illustrates that only asthmatics who receive a combination of inhaled corticosteroid (ICS) and long-acting bronchodilators (LABA) in a single inhaler are optimally controlled. Once again, this finding cannot be generalized to all asthmatics but does suggest that such medications should not be withheld from asthmatics who may need better asthma control drugs. Most certainly, no asthmatics should be forced to use separate devices for ICS and LABA, as is currently the trend in both private and state practice. [16]

There was a suggestion that current and past smoking were related to a higher risk of emergency department visits. Compared with never smoking, current smoking was prospectively associated with a greater risk of hospitalisation and hospital-based care for Asthma, as well as affecting treatment outcomes. Cigarette smoking could increase the severity of Asthma by accelerating the loss

of lung function that typically accompanies Asthma. Cigarette smoking may also reduce the responsiveness to inhaled corticosteroids, the cornerstone of controller therapy for Asthma. Cigarettes may induce pro-inflammatory cytokines or alter airway inflammatory cell phenotypes (e.g., increased neutrophils or reduced eosinophils), resulting in poorer asthma control. [17]

Asthma treatment in Nigeria illustrates that sodium cromoglicate, aerosol isoproterenol, and aerosol salbutamol have been shown to improve ventilator function in asthmatics. Several drug trials in Nigeria have demonstrated the effectiveness of inhaled steroids, long-acting beta two agonists and leukotriene antagonists in Asthma. Many asthmatics in Nigeria are treated symptomatically with only oral bronchodilators such as salbutamol and aminophylline – usually under self-supervision. Spacers and written management plans are not often used, and 25% of doctors prescribe antibiotics routinely to manage acute Asthma. There is inadequate documentation of vital information crucial to patient short-term and long-term care, frequent use of aminophylline, and insufficient instructions on discharge medications and follow-up in the emergency room. For long-term asthma control, oral steroid was often used (81%). High costs of inhaled steroids, fear of side effects, and inability to use the inhaler correctly have been shown to contribute to poor adherence.[18]

In Nigeria, over half of the patients used short-acting $\beta 2$ agonist (SABA) alone for maintenance therapy (oral SABA; 34%, inhaled SABA 23%). The use of inhaled corticosteroids (ICS) either alone or combined with a long-acting inhaled $\beta 2$ agonist (LABA) was not every day (ICS alone; 6%, ICS and LABA combination; 14%). The total asthma control test (ACT) scores ranged from six to twenty-five, with an average of 82.9% of patients having poor control, 14.3% being well-controlled, and only 2.9% having total control of their asthma symptoms. Thus, 17.2% of patients had reasonable asthma control (total score ≥ 20). [19

In Uganda, most of the patients diagnosed with Asthma were in the 13-34 age group, and up to 70% were female. This is consistent with findings by Gustavo JR and others in an asthma study in Spain and Latin America, which found that 37.5% of the patients were in the 15-35 age group and 72% were female. The most typical asthma symptom was wheezing.^{19, 20, 21} This study assesses that appropriate asthma treatment was low, both at the chest clinic and accident and emergency department. Still, it was worse at the emergency department. For example, over 50% of the patients received oral salbutamol therapy instead of inhaled salbutamol. The main reason may be cost because inhaled steroids and beta₂ agonists are more expensive than oral steroids and beta₂ agonists. In the emergency department, only 20.7% of the patients were nebulized, and only 2.4% received nebulization with oxygen, even though nebulization equipment and oxygen are available most of the time. This finding could be due to a lack of awareness by the attending health workers. [20, 21]

In the Ethiopia Hadiya Zone, Southern Ethiopia, the majority of 174 asthmatic patients (62.6%) were male, and the mean age of the respondents was 35.1 years with a standard deviation (SD) of 9.4. Most (53.45) used asthma medication, salbutamol plus Prednisolone, for long-term asthma control. Among the patients, 40.8% were prescribed antibiotics for respiratory and urinary tract infections. The study shows that there is a strong effect of social drug abuse on disease improvement (p-value<0.05). [22]

3. OBJECTIVE

3.1. General objective:

• To evaluate the treatment strategies and clinical outcomes among asthmatic patients at Yekatit 12 Hospital in 2022.

3.2 Specific Objectives:

- 1. To identify the types of pharmacological treatments prescribed to asthma patients.
- 2. To assess the clinical outcomes of asthma treatment (e.g., symptom control, frequency of exacerbations, hospitalisation).
- 3. To determine the level of adherence to prescribed asthma medications.
- 4. To explore the association between treatment strategy and clinical outcomes.

4. METHOD AND MATERIAL

4.1 Study area and study period

The study was conducted at Yekatit 12 Hospital, officially known as Yekatit 12 Hospital Medical College. This prominent healthcare institution, established in 1923, is located in Addis Ababa, Ethiopia. It has a long-standing history of providing medical services and training healthcare professionals. The hospital serves a vast population and offers comprehensive medical services and training. Addis Ababa, Ethiopia's capital and largest city, is characterised by its diverse population representing various socioeconomic and cultural backgrounds. As of the 2007 national census, the city had a population of approximately 2.74 million, with major ethnic groups including the Amhara, Oromo, Gurage, and Tigrayan. The town also boasts a well-developed healthcare infrastructure, featuring both public and private health institutions, making it an ideal setting for accessing many emergency patients.

A Retrospective Cross-Sectional study was conducted at Yekatit 12 Hospital Medical College's Internal Medicine Department. The hospital's extensive electronic medical record system facilitated efficient data collection, encompassing detailed patient demographics, medical histories, investigation results, diagnoses, and disease progression. This study setting was chosen due to the hospital's long-standing reputation, diverse patient population, and the availability of comprehensive medical records, ensuring a

robust and representative analysis. An institutional-based cross-sectional study was carried out in Yekatit 12 hospital medical colleges. The study was conducted from March 1-15, 2022, G.C.

4.2 Study design

A retrospective cross-sectional study was conducted using the medical records of asthmatic patients who visited Yekatit 12 Hospital over the past two years (January 1, 2020 – January 1, 2022 G.C.).

4.3 Populations

4.3.1 Source population

All asthmatic patients who visited Yekatit 12 Hospital Medical College

4.3.2 Study population

All adult asthmatic patients who visited Yekatit 12 Hospital Medical College over the past two years, up to January 2022.

4.4 Eligibility Criteria

4.4.1 Inclusion Criteria: • All patients aged 18 years and older. • Patients who have been visiting the hospital for the past two years. **4.4.2 Exclusion Criteria:** • Patients who initiated treatment within one month prior to the study. • Patients with incomplete asthmatic profile forms (medical records).

4.5 Sample Size Determination

The required sample size for the study was calculated by using the simple population proportion formula by considering 50% proportion of asthmatic patients

$$n_0 = Z\alpha/2^2 p (1-p) / w2$$

= [1.96]2[0.5][0.5]/[0.05]2
=384

The above sample was going to be taken from a relatively small population (<10,000), then the sample size has been adjusted as;

$$n = n_0 / (1 + n_0 / N)$$

= 384/1+ (384/463)
= 210

Then, we took 10% of 210 as a contingency value as the data was not filled correctly.

Finally, a total number of 231 patient cards was calculated as the sample size of the study

Where n=desired sample

z=level of significance at 95% confidence interval

p=an estimate of the proportion of asthmatic patients

w=marginal error

N= total sample

4.6 Study variables

4.6.1 Independent variables

- Age
- Sex
- Religion
- Occupation
- Marital status
- Social drug use
- Concurrent medications

4.6.2 Dependent variables

- Prescribing pattern of anti-asthma medication
- Frequency of SABA use per week or SABA consumption per week
- Treatment outcome
- Clinical characteristics
- Asthma exacerbation and hospitalization

4.8. Data Quality Assurance

The data collection format was designed after reviewing relevant literature to ensure the inclusion of all variables necessary to address the study's objectives. Data was checked daily for completeness, accuracy, and consistency.

4.9. Data Processing and Analysis

After collecting all necessary data, it was reviewed for completeness, sorted, and categorized appropriately. The data was then processed, analyzed, and interpreted. Throughout the data collection period, the principal researcher regularly gathered completed questionnaires from the research assistants, checking them for accuracy and completeness. Data entry and cleaning were conducted using SPSS version 20. Variables suspected to be associated were examined using cross-tabulation. Descriptive statistics were applied to summarize the distribution and percentages of study variables. The results were presented in tables, graphs, and narrative form, depending on the nature of the data.

4.10. Ethical Consideration

The Ethical Review Committee of the Yekatit 12 Hospital Public Health Department granted formal approval for the study. Each questionnaire's cover page included an introduction to the study, details about the inquiry method, and a confidentiality statement. Participants were informed of their right to participate voluntarily or decline, with the option to withdraw at any time during the interview. Strict confidentiality was maintained by assigning codes instead of using participants' names, ensuring that no information was shared with individuals not directly involved in the study without the participants' consent.

5. RESULT

5.1 Socio-demographic characteristics of asthmatic patients

Out of the 210 asthmatic patients studied, 106 (50.50%) were female and 104 (49.50%) were male, resulting in a male-to-female ratio of approximately 1:1. The mean age of the participants was 43.25 years (\pm 12.6). Among these patients, 83.76% were married, 33.81% were housewives, and 51.91% were Protestant.

Characteristics	Status	N=210 N (%)	Mean(SD)
Sex	Male	104(49.5)	
	Female	106(50.5)	
	Total	210 (100)	
Age classification	18-24	19(9)	
8	25-34	28(13.33)	
	35-44	73(34.76)	43.25(±13.6)
	45-54	54(25.71)	· · · · · · · · · · · · · · · · · · ·
	55-64	13(6.19)	
	>64	23(10.95)	
	Total	210(100)	
Religion	Orthodox	76(36.19)	
ε	Protestant	109(51.905)	
	Muslim	25 (11.905)	
	Total	210 (100)	
Marital status	Unmarried	37 (17.6)	
	Married	173 (83.76)	
	Total	210 (100)	
	Farmer	66 (31.43)	
	Student	33 (15.71)	
Occupational status	Housewife	71 (33.81)	
-	Employed	28 (13.33)	
	Merchant	12 (5.71)	
	Total	210 (100)	
	None	126(60)	
	Alcohol only	19(9)	
Social drug use	Chat only	27(12.38)	
-	Alcohol and chat	17(8.004)	
	Alcohol, tobacco and chat	16(7.62)	
	Tobacco only	5(2.38)	
	Total	210(100)	

Table 1. Socio-demographic characteristi	ics of asthmatic natients at Vekatit	12 hospital medical colleges 1/ '	2020-Jan 1/2022
Table 1. Socio-ucinographic characteristi	cs of astimatic patients at Texatit	. 12 nospital incurcal concecs.1/	2020-Jan 1/2022

Regarding the period of studied asthma patients, 20.00% of them had periods of 2 years, and 2.38% had only 7 months [Figure 1].



Fig 1: The period of asthmatic patients at Yekatit 12 hospital medical colleges. Jan 1/2020-Jan 1/2022

5.2 Co-morbid and precipitating diseases of asthmatic patients

Among the studied patients, 38.57% had no documented precipitating condition in their medical charts. Among those with a recorded cause, the most common precipitating diseases were community-acquired pneumonia (23.33%), dyspepsia (18.57%), and urinary tract infection (15.24%).

Table 2: Precipitating disease of asthmatic patients at Yekatit 12 hospital medical colleges, Jan 1/2020-Jan 1/2022

SN	Precipitating disease	N=210 N (%)
1	No precipitating diseases	81 (38.57)
2	CAP	49 (23.33)
3	GERD and dyspepsia	39 (18.57)
4	UTI	32 (15.24)
5	PTB	5 (2.38)
6	URI	4 (1.90)
	Total	210(100)

Only 12% of asthmatic patients had documented chronic diseases, while the remaining patients had no recorded chronic co-morbid conditions.

Table 3: Co-morbid disease of asthmatic patients at Yekatit 12 Hospital medical colleges. Jan 1/2020-Jan 1/2022

S.N	Co-morbid diseases	N=210
		N (%)
1	No co-morbid diseases	178 (84.76)
2	COPD	11 (5.24)
3	HTN	7 (3.33)

4	CHF	5 (2.38)
5	Allergic rhinitis	5 (2.38)
8	Dermatologic disorder	2 (0.95)
5	Toxic nodular goitre	2 (0.95)
	Total	210 (100)

Dermatological disorder: melasma, dermatitis and skin rash

5.3 Asthma Pharmacotherapy Pattern

Of 210 studied asthmatic patients, 83(39.52%) received SABA (salbutamol puff, salbutamol tab) and Prednisolone anti-asthmatic drug combination therapy. The second prescribed combination therapy was salbutamol SABA and Beclomethasone puff 50(23.8%). No drug was prescribed as monotherapy.

Table 4: The combination of anti-asthmatic drugs among asthmatic patients at Yekatit 12 hospital medical colleges. Jan 1/2020-Jan 1/2022

Asthma medication	N=210
	N (%)
SABA and Prednisolone	83 (39.54)
SABA and beclomethasone puff	50 (23.8)
SABA, beclomethasone puff and Prednisolone	46 (21.9)
SABA (Salbutamol puff and salbutamol tab) only	31 (14.76)
Total	210 (100)

Among anti-asthmatic drugs, the most frequently prescribed medication was short-acting β 2-agonists (SABA), accounting for 63.8% of all prescribed anti-asthma treatments—salbutamol puff (34.09%) and oral salbutamol (29.71%). Inhaled corticosteroids (ICS), specifically beclomethasone puff, comprised only 15.58%, while oral steroid prednisolone accounted for 20.62% of the prescribed anti-asthma drugs.

Table 5: Anti-asthmatic drug prescription pattern among asthmatic patients at Yekatit 12 hospital medical colleges. Jan 1/2020-Jan 1/2022

S.N	Ant-asthmatic medications	N (%)	
1	Salbutamol puff	210 (34.09)	
2	Salbutamol tab	183 (29.71)	
3	Prednisolone	127 (20.62)	
4	Beclomethasone puff	96 (15.58)	
Total		616 (100)	

Among the 210 asthmatic patients studied, 80 (38.09%) had no concurrent medication prescribed. Among those who received additional medications, antibiotics were the most commonly prescribed, accounting for 56.19%. Following antibiotics, the most frequently prescribed drugs were those for dyspepsia, GERD, and GI ulcers—including antacids, omeprazole, and cimetidine—which comprised 22.86% of concurrent prescriptions.

Table 6: Concurrent medication prescribed among asthmatic patients at Yekatit 12 hospital medical colleges. Jan 1/2020-Jan 1/2022

SN	Concurrent medications	N=210 N (%)
1	No concurrent medication	80(38.09)
2	Antibiotics	118 (56.19)
3	Drugs for GERD and dyspepsia	48 (22.86)
4	Cardiac medications	22 (10.48)
5	Anti-pain medication	17 (8.09)
6	Dermatological drugs	10 (4.76)
7	Anti-histamine	5 (2.38)
8	CNS drugs	5 (2.38)
9	Anti-thyroid	2(1)

Antibiotics: Doxycycline, Ceftriaxone, anti-TB medications, Augmentin, Clarithromycin, Azithromycin, Erythromycin, Metronidazole, Chloramphenicol, Amoxicillin, and Crystalline penicillin.

Drugs for GERD and Dyspepsia: Antacids, Omeprazole, and Ciprofloxacin.

Cardiac Medications: Spironolactone, Digoxin, Hydrochlorothiazide (HCT), Lovastatin, Propranolol, Furosemide, and Enalapril. **Anti-Pain Medications:** Acetylsalicylic acid (ASA), Diclofenac, Paracetamol, and Ibuprofen.

Dermatological Products: Cloderm, Calamine Lotion, Dexamethasone cream, and Vaseline.

Antihistamines: Loratadine and Cetirizine.

Central Nervous System (CNS) Drugs: Amitriptyline.

Anti-Thyroid Medication: Propylthiouracil (PTU).

5.4 Clinical Characteristics of Asthmatic Patients



Fig 2: Asthma exacerbation among asthmatic patients at Yekatit 12 Hospital medical colleges. Jan 1/2020-Jan 1/2022



Fig 3: Hospitalisation among asthmatic patients at Yekatit 12 hospital medical colleges. Jan 1/2020-Jan 1/2022 Most patients were hospitalised for symptoms other than Asthma (60.29%).



Fig 4: Cause of hospitalization among asthmatic patients at Yekatit 12 hospital medical colleges. Jan 1/2020-Jan 1/2022

Shortness of breath was the most common asthma symptom observed among the studied patients during their visits. Wheezing was prevalent during the first two visits, occurring at rates of 61.90% and 12.38%, respectively, but was lower in subsequent visits. Chest tightness was the least frequently reported asthma symptom throughout the study period.

Table 7: Asthma symptoms manifested during each visit among asthmatic patients in Yekatit 12 hospital medical colleges.Jan 1/ 2020-Jan 1/2022

Asthma	1 st visit	2 nd visit	3 rd visit	4 th visit	5 th visit	6 th visit	7 th visit	8 th visit
symptom								
		N (%)						
Symptom-	25(11.9)	63(30)	103(49)	118(56.2)	140(66.5)	133(63.3)	130(61.9)	143(68.1)
free								
wheezing	130(61.90)	26(12.38)	19(9.04)	23(10.95)	24(11.43)	14(6.66)	20(9.25)	10(4.76)
cough	151(71.90)	115(54.76	74(35.24)	72(34.28)	47(22.38)	62(29.52)	57(27.14)	40(19.05)
SOB	172(81.91)	120(57.14)	63(30)	45(21.42)	55(26.19)	66(31.43)	45(21.43)	42(20)
Chest	68(32.38)	23(10.95)	22(10.48)	20(9.25)	2(2.85)	9(4.28)	12(7.71)	10(4.76)
tightness								

5. 5 Treatment outcome among asthmatic patients

Of the 210 asthmatic patients studied, 63 (29.5%) used short-acting β 2-agonists (SABA) twice per week. The mean number of days of SABA use per week was 3.09 (±1.50).

Table 8: Average days of SABA use per week among asthmatic patients at Yekatit 12 Hospital medical colleges. Jan 1/2020-Jan 1/2022

Average days of SABA use per week	N=210	Mean \pm SD
	N (%)	
1	31 (14.8)	
2	63 (29.5)	3.09 (±1.504)
3	34 (16.2)	
4	36 (17.1)	
5	37 (17.6)	
6	8 (3.8)	
7	2(1)	
Total	210 (100)	

Of 210 asthmatic patients studied, 118 (56.2%) had poorly controlled Asthma, while the rest had controlled Asthma: 92 (43.8%). Thus, more than half of the patients' symptoms were poorly controlled.



Fig 5: Asthma treatment outcome among asthmatic patients at Yekatit 12 hospital medical colleges. Jan 1/2020-Jan 1/2022

5.6 Association between socio-demographic characteristics, clinical patient characteristics and treatment outcomes There is a strong association between asthma exacerbation and occupational status (p-value=0.00) and social drug use (p-value=0.001) among asthmatic patients.

Table 9: Cross-tabulation between asthma exacerbation and socio-demographic characteristics among asthmatic patient
at Yekatit 12 Hospital medical colleges. Jan 1/2020-Jan 1/2022

	Asthma exa	acerbation			
Characteristics.	status			N=21	p-value
		Yes (%)	No (%)	N (%)	
Sex	М	54(25.7)	50(23.8)	104(49.5)	0.064
	F	64(30.5)	42(20)	106(50.5)	
Age (years)	18-24	10(4.76)	9(4.24)	19(9)	0.090
	25-34	16(7.62)	12(5.71)	28(13.33)	
	35-44	40(19.05)	33(15.71)	73(34.76)	
	45-54	37(17.62)	17(8.09)	54(25.71)	
	55-64	4(1.90)	9(4.29)	13(6.19)	
	>65	17(8.09)	6(2.05)	23(10.95)	
Religion	Orthodox	43 (20.45)	43 (20.45)	86 (40.90	
	Protestant	73 (34.76)	41 (19.52)	114(54.28)	0.052
	Muslim	8 (3.8)	2 (0.95)	10 (4.76)	
	farmer	53(25.24)	13(6.19)	66(31.43)	0.000
Occupational	student	17(8.09)	16(6.81)	33(15.71)	
Status	Housewife	32 (15.24)	39 (18.57)	71 (33.81)	
	employed	12 (5.71)	16(7.62)	28(13.33)	
	Merchant	10 (4.71)	2(1)	12 (5.71)	
	None	68(32.38	58 (27.62)	126 (60)	
Social drug use	Alcohol only	5 (2.38)	14 (6.67)	19 ((9.05)	0.001
	Chat only	20 (9.52)	7 (3.33)	27 (12.85)	
	tobacco only	4 (1.90)	0 (0)	4 (1.90)	
	Alcohol, tobacco and chat	13 (6.19)	3 (1.43)	26 (12.38)	
	Alcohol and chat	14 (6.67)	4 (1.90)	18 (8.57)	

There is no association between treatment outcome and sex, religion, age and occupation. But there is an association between treatment outcome and social drug use (p-value0.031)

Table 10:	Cross-tabulation	between asthma	treatment	outcome a	and s	socio-demographic	characteristics	among	asthmatic
patients at	Yekatit 12 hospit	tal medical colleg	es. Jan 1/ 20	020-Jan 1/	2022	2			

		Treatment outcom				
Characteristics.		Poorly	Well-controlled	N=210		
	status	controlled Asthma (%)	Asthma (%)	N (%)	p-value	
Sex	М	54 (25.7)	50 (23.8)	104 (49.5)	0.306	
	F	64(30.5)	42(20)	106 (50.5)		
	Protestant	60 (28.57)	53 (25.24)	113 (53.81)		
Religion	Orthodox	52 (24.76)	34 (16.19)	86 (40.95)	0.722	
	Muslim	6 (2.86)	5 (2.38)	11 (5.24)		
Age (years)	18-24	7(3.3)	12(5.7)	19(9)	0.341	
	25-34	13(6.19)	15(7.14)	28(13.33)		
	35-44	47(22.38)	26(12.38)	73(34.76)		
	45-54	34(16.19)	20(9.52)	54(25.71)		
	55-64	7(3.33)	6(2.86)	13(6.19)		
	>64	10(4.76)	13(6.19)	23(10.95)		
	farmer	40 (19.05)	26 (12.38)	86 (40.95)		
Occupational	student	15 (7.10)	18 (8.57)	33 (15.71)		
status						
	Housewife	33 (15.71)	31 (14.76)	64 (30.47)	0.192	
	employed	18 (8.57)	16 (7.61)	34 (16.19)		

	Merchant	1 (0.47)	12 (5.71)	13 (6.19)	
Social drug use	No social drug	78(37.14)	48(22.86)	126(37.37)	0.031
	use				
	Alcohol only	7(3.33)	12(5.71)	19(6.04)	
	Chat only	12(5.71)	14(6.67)	27(12.38)	
	tobacco only	5(2.38)	0(0)	5(2.38)	
	Alcohol, tobacco	5(2.38)	11(5.24)	16(7.62)	
	and chat				
	Alcohol and chat	11(5.24)	7(3.33)	18(8.57)	

6. DISCUSSION

Among the 210 asthmatic patients studied, 118 (56.2%) had poorly controlled asthma, while the remaining 92 (43.8%) had wellcontrolled asthma. More than half of the patients exhibited inadequate symptom control, differing from asthma control research conducted in South Africa. In that study, among 1,276 asthmatic patients, 855 (67%) had well-controlled asthma, while the rest had poorly controlled asthma [16]. This discrepancy may be attributed to various factors affecting asthma treatment outcomes, such as occupational status and social drug use.

Most patients diagnosed with asthma were within the 34–45 age group (34.6%), with a male-to-female ratio of approximately 1:1. This finding contrasts with studies conducted in Uganda, Spain, and Latin America, where 37.5% of asthma patients were in the 15–35 age group, and 72% were female [19, 20, 21]. These differences may be due to geographical and occupational variability across countries.

In this study, 25.6% of asthma exacerbations were precipitated by lower and upper respiratory infections. This aligns with an analysis conducted in the United States, where 22% of acute asthma patients received antibiotic treatment. These findings suggest that respiratory infections are common triggers for asthma exacerbations, potentially due to healthcare providers interpreting acute asthma symptoms as those of respiratory infections.

Additionally, 14.76% of patients routinely used only short-acting β 2-agonists (SABA), either orally or through inhalation, for long-term asthma control. This rate is lower than that reported in Nigerian studies, where 57% of patients relied on SABA alone for asthma management [18].

Despite recommendations from the Global Initiative for Asthma (GINA) guidelines, the most commonly prescribed asthma drug combination was SABA plus Prednisolone, received by 39.54% of patients for long-term asthma control. This finding is consistent with a study conducted in Nigeria, where 41% of asthma patients were prescribed oral corticosteroids for long-term management [17]. The preference for this treatment approach may be due to the high cost of inhaled corticosteroids (ICS) and poor physician adherence to guideline recommendations.

ICS remains the most effective anti-inflammatory medication for managing persistent asthma. Studies have demonstrated its efficacy in long-term asthma control [11]. However, only 45.7% of patients in this study used ICS in combination with other drugs. This low utilization rate is consistent with findings from Nigeria, where ICS usage was reported at 38% [18]. In contrast to GINA guidelines, no patients in this study used ICS with long-acting β 2-agonists (LABA) or LABA alone, likely due to poor adherence to standard treatment guidelines (STG).

This study found that 56.19% of patients were prescribed antibiotics for managing upper and lower respiratory tract infections and urinary tract infections. This finding contrasts with studies conducted in the United States, where only 22% of patients with acute asthma received antibiotic treatment. The higher rate of antibiotic prescriptions in this study may be due to healthcare professionals interpreting acute asthma symptoms as bacterial respiratory infections.

Prednisolone was the third most commonly prescribed anti-asthmatic drug in this study, aligning with findings from a survey conducted in Kedah, Malaysia [29] and other research. A study in the Saurashtra region of India also reported the use of corticosteroids, both as monotherapy and in combination therapy [1]. However, the potential adverse effects associated with corticosteroids may limit their use compared to short-acting β 2-agonists (SABA). Prednisolone remains one of the most effective anti-inflammatory medications for managing persistent asthma, offering benefits such as symptom reduction, improved lung function, decreased airway hyperresponsiveness, better airway inflammation control, reduced exacerbation frequency and severity, and lower asthma-related mortality rates, which may contribute to its high utilization.

Inhaled corticosteroids (ICS) are currently the most effective anti-inflammatory medications for treating persistent asthma, with studies demonstrating their efficacy in long-term asthma management [11]. In this study, only 45.7% of patients used ICS in combination with other drugs. This low utilization rate aligns with findings from Nigeria, where ICS usage was reported at 38% [18]. However, contrary to GINA guidelines, no patients in this study received ICS+LABA or LABA alone, likely due to poor adherence to standard treatment guidelines (STG).

The choice of medication for asthma therapy, along with co-morbid conditions and precipitating diseases, are key determinants of treatment outcomes. Despite the availability of effective asthma treatments, this study found that asthma control among the patients remained suboptimal, falling short of GINA guideline recommendations. A total of 56.2% of the patients had poorly controlled asthma. This finding differs from a previous survey of asthma patients in Uyo, Nigeria, which reported poor asthma control in 80% of patients. That study also observed a significant association between ICS underutilization and reliance on systemic steroids, both of which were linked to uncontrolled asthma [18].

While gender, marital status, religion, age, and occupation were not significantly associated with treatment outcomes in this study, social drug use was found to have a significant impact on asthma control (p-value = 0.031). This result aligns with findings from a study conducted in England [21].

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusion

Among the anti-asthmatic medications, short-acting β 2-agonists were the most frequently prescribed. The most common combination therapy involved short-acting β 2-agonists and Prednisolone. This study highlights that, despite the availability of effective asthma treatments, asthma control among the studied patients remains inadequate and does not align with standard guideline recommendations, including those outlined in the Ethiopian national guidelines. A considerable proportion of patients exhibited poor asthma control. Furthermore, a significant association was observed between treatment outcomes and social drug use.

7.2 Recommendations

- Yekatit 12 Hospital should allocate resources to educate healthcare professionals and patients on current asthma management recommendations to improve the quality of care.
- Healthcare professionals should ensure accurate documentation of asthma symptoms, rescue medication use, and the duration of prescribed treatments during each patient visit.
- > Yekatit 12 Hospital should train physicians to enhance adherence to Ethiopian standard guidelines for asthma management.
- > The use of a combination of long-acting β 2-agonists with inhaled corticosteroids should be encouraged for long-term asthma symptom control.
- Yekatit 12 Hospital should consider developing its own institutional asthma treatment guidelines to complement national and international protocols and tailor them to its specific clinical context.

Limitations of the Study

This study has several significant limitations. Firstly, its retrospective design restricted the ability to thoroughly assess causal relationships and robustly evaluate predictors of treatment outcomes. Secondly, it did not explore specific factors associated with poor asthma symptom control, which could have provided deeper insights into the underlying causes of suboptimal management.

List of Abbreviations and Acronyms

GINA – Global Initiative for Asthma Management and Prevention

WHO - World Health Organization

DALYs – Disability-Adjusted Life Years (a measure of overall disease burden)

- **YLD** Years Lost to Disease (years of life lost due to illness or disability)
- NAEPP National Asthma Education and Prevention Program
- **ISAAC** International Study of Asthma and Allergies in Childhood
- **STG** Standard Treatment Guideline
- SABA Short-Acting Beta2-Agonist
- LABA Long-Acting Beta2-Agonist
- ACT Asthma Control Test
- **ICS** Inhaled Corticosteroid
- **DDH** Dembi Dollo General Hospital

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