



ASSESSMENT OF ASTHMA PHARMACOTHERAPY AMONG ASTHMATIC PATIENT IN MEDICAL WARD OF GHIMBI GENERAL HOSPITAL, WEST WOLLEGA ZONE, ETHIOPIA

Dinka Dugassa, Ginenus Fikadu, Ayana Tadesse and Habte Gebeyehu

Wollega University, Ethiopia.

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Corresponding author: Dinka Dugassa
Wollega University, Ethiopia.

1. INTRODUCTION

1.1. Background

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. The chronic inflammation is associated with airway hyper responsiveness that 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 either spontaneously or with treatment. However, the diagnosis of asthma is in most cases a clinical one than one of the symptoms of wheeze, cough, chest tightness, and breathlessness with variable airway obstruction is usually sufficient to make a diagnosis of 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 major health problems world-wide, 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. 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 difficult 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, leuonkotrien 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]

Intercountry 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%, most of the asthma medications prescribers do not follow asthma management guidelines in many Low and Medium Income Countries. In Ethiopia the prevalence asthma is 9.1% as per PLOS medicine asthma in Africa, and In Jimma it is around 3.9% for those living with 150 meter of surface road and 3.7% for those living more than 150 meter away which is slightly less than Addis Abeba (11.4%).^[5,6,7]

Medication to asthma can be classified as controllers or relievers. Controllers are medications taken daily on long term basis to keep asthma under clinical control chiefly through their anti-inflammatory effects. They include inhaled and systemic corticosteroids LRAs (leukotriene

receptor antagonist), LAIGs (long acting inhalation glucocorticosteroids), sustained release theophyllines, cromones, anti-IGE (immuno-globin E), and other systemic steroid-sparing therapies. Reliever is medications used on as needed basis that act quickly to reverse bronchi-constrictions and relieve its symptoms. They include rapid-acting inhaled B₂-agonists (SABA), inhaled anti cholinergic, short acting theophyllines and short acting oral B₂-agonists.^[8,9,10]

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

Salbutamol or albuterol is the most widely prescribed bronchodilator on the control of asthma and first line agent in management of asthma where they are used as required by patient for symptomatic relief of breathlessness and wheezing.^[11,12]

Corticosteroids constitute the commonly used among others. Inhaled corticosteroids are preferred first line controller therapy for mild-moderate persistent asthma. Inhaled corticosteroids are also considered standard daily preventive treatment as it shows decrease in frequency and episodes as well as the risk of asthma hospitalization. Asthma is a chronic inflammatory response to airway. Corticosteroids are anti-inflammatory drugs. This could be because of the inhibit many components of the asthma inflammatory response.^[13,14]

Methyl-xanthenes have been utilized in treatment of asthma because they have a demonstrated efficacy in attenuating the three cardinal features of asthma reversible airflow and airway inflammation. At a lower a serum concentration, theophyllines are a weak bronchodilator but retain its capacity immune-modulator, anti-inflammatory and bronchio-protective drug. Hence, theophyllines predominant role in asthma treatment is a controller for chronic, persistent disease and should not be given at low doses.^[15]

Oral tablets become necessary in patients who don't comply to the inhalation where he or she is unable to use inhaler therapy effectively. There is high compliance with prescribed oral medications compared with inhaled anti-inflammatory medications for asthma. It is important to note that oral medications are not affected by

inhalation technique and lung deposition that may reduce drug effectiveness.^[16]

1.2. Statement of the Problem

The global initiative for Asthma (GINA) guide line and statics released by the world health organization (WHO) indicate that the prevalence of asthma is increasing worldwide. It estimated that about 5% the adult population and 10-15% children in the world are suffering from asthma, in which most of them are under treated and with poorly Controlled asthma. The international survey of asthma and allergy in child hood (ISAAC) report showed that the asthma prevalence was 9% in Africa school children age 13-15.^[17]

Asthma is an important public health problem worldwide on account of its prevalence; it's under recognition, in adequate pharmacotherapy and self-management by the patient. There is evidence to suggest the denial of having chronic condition, poor knowledge of the disease process; medication use and poor self-management are frequent reason for increased morbidity in asthma. These issues are particularly relevant in respect of primary care, through which most asthma cases are managed. More over the issue of not managing asthma in the community according to well established standard treatment guidelines (STG) with inhalation therapy and self-management program in developing countries is more worrisome.^[18]

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 health care system, and accounts for between 250-300 deaths per year. Given that asthma can be well controlled for the vast majority of patients, identifying those patients who may be at greater risk for poorly controlled asthma represents an important goal for global asthma prevention.^[4]

The national asthma education and prevention program of USA (NAEPP) guide line adopted stepped care approach to pharmacotherapy increasing treatment intensity with asthma severity. Regardless of the wide spread of awareness of the NAEPP guideline, asthma still poorly controlled due to physicians non adherence to the guideline or poor understanding of treatment guideline. The lack of a clinical gold standard for determining asthma control, as well as inadequate recognition of uncontrolled asthma by patients and physicians, may contribute to this situation. Patient non adherent to therapy is the other factor for poorly controlled asthma.

To deal this problem different approaches have been proposed. WHO promulgate guide line for chronic

diseases management including asthma and the development of questionnaire tools to measure asthma control in clinical setting. One such tool is the asthma control test (ACT) which is based on 5 item survey that assess interference with activity, shortness of breath, nocturnal symptom, rescue medication use and self-rating asthma symptom. Regardless of these interventions, asthma is poorly controlled all over the world 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. In spite of this, the control of asthma is generally poor. The Asthma Insights and reality in Europe study reported persistence of day time symptoms of up to 46% among asthmatics under treatment.^[3]

Most leading of death and disability in developing Countries can be prevented, treated or at least can be alleviated with cost effective essential drugs. Despite this fact, literally hundreds of millions of people don't have regular access to essential drugs. Many of those who don't have access are being treated with the wrong treatment, receive too little medicine for their illness or don't use the drugs correctly.^[19]

Research conducted in 2012 in Gujarat in India showed asthma creates a substantial burden on individual and families as it is more often undiagnosed and under treated. In India, it was seen as one of leading cause of morbidity and mortality. In India, 3-5% pediatric population is affected by asthma whereas in adults the prevalence ranges from 3-11%. Though effective screening, evaluation, and management strategies for asthma have not been fully implemented in India, there is reduction in asthma exacerbation. Long term treatment of asthma has an effect on the cost of therapy and patient's compliance, as well as it was found that all patients couldn't purchase all prescribed medicines. Lack of money was the mean reason for partial prescription both in rural and urban.^[20]

Many health PR actioners give oral anti-asthmatics which have more side effect than in-halation anti-asthmatics. Anti-asthmatic drugs given as inhalation therapy are more beneficial to the patients than systemic therapy. Hence, their maximum utilization in asthmatics will go a long way in minimizing the incidence of acute asthma as well as the adverse effect of anti-asthmatics drugs.^[21]

The incidence of drug induced adverse effect is likely to increase as result of exposure elderly patients to poly pharmacy which is common also in anti-asthmatic drugs utilization.^[22]

Long term treatment with oral corticosteroids can result in serious systemic adverse effect such as suppressed adrenal function, bone loss, skin thinning and cataract formation. Inhaled corticosteroids appear to be relatively

well tolerated when administered at doses below approximately 1000 micro-gram. However larger dose of inhaled corticosteroid may affect hypothalamic pituitary adrenal function and bone formation.^[22]

Accordingly to research conducted by Dr. Tobin (2005) systematic Salbutamol has metabolic effect that may worsen respiratory function in asthma and should not be given intravenously to asthma patients of clinical trial. For patients who fail to respond to inhaled B2-agonist, ipratropium and systemic steroids, consideration should be given to other therapies such as non-invasive ventilation rather than increasing the dose of a drug that may paradoxically worsen respiratory function.^[23]

1.3. Significance of the Study

Anti-asthmatic drugs have been used irrationally for as long as they have been available, this reduces quality of care, waste resource and causes harm to patients. For this reason drug use evaluation prevent medication related problem and enhance patients' outcome.

The most challenging in worldwide today is over and under dose using of anti-asthmatic drugs which leads to inadequate patients' outcome and different adverse reactions to the patients. Inhalational anti-asthmatic drugs and corticosteroids are most commonly inappropriate used anti-asthmatic drugs in developing countries. To decrease such problems drug use evaluation is the most important.

The extent and consequence of anti-asthmatic irrational use occur worldwide but more common in developing countries like African countries, Ethiopia where regulation guidelines, professionals, drug information diagnostic facilities and other health care system are deficient. So, retrospective study will be the way of decreasing such problems.

In Ethiopian, the pattern prescription and utilization depends on the availability of drugs, patients' economic level and physician performance. All anti-asthmatic drugs are not available, many patients can't afford money to buy all prescribed drugs and many healthcares are not enough with knowledge to prescribe appropriate anti-asthmatic drugs depending on patients' individual characteristics.

Asthma is the global issue for which most patients symptoms are poorly controlled. Even though there are many data worldwide, there are few literatures on asthma in Ethiopia Therefore, the aim of this study was to assess asthma treatment and outcome among asthmatic patient in Medical Ward of Ghimbi General Hospital, which will pave the way to tackle the problem of irrational use of asthma drugs.

This study will help to know the situation of anti-asthmatic prescription pattern and to know whether symptoms are controlled or poorly controlled. It also

assess whether asthma drug prescription conform the GINA and Ethiopia's treatment guidelines.

The finding of this study will help policy makers and health planners for designing strategy towards promoting asthma therapy.

The information identified by this study may also services as secondary data for subsequent research that deal with asthma treatment.

1.4. LITERATURE REVIEW

Asthma is still one of the major health problems worldwide, particularly increasing in developing countries. Although new drugs and evidence-based guidelines have been developed in recent years, there has been no major change in asthma morbidity and mortality and it continues to be under-treated.^[24]

According to research conducted in Saushatra region in India; overall drug utilization pattern showed that B2-agonists were the drugs of choice for asthma patients. Specifically, short acting B2-agonist (SABA) and methyl-xanthenes derivatives or their combination were the most commonly used by majority of mild to severe asthma patients. Combination with SABA is more effective than either agent alone use. Corticosteroids were found to be through mono-therapy and combination-therapy. However potential adverse effect associated with corticosteroids restricted to their use as compared to SABA.^[25]

Accordingly to research conducted on anti-asthmatic drugs utilization in 2011Tami, Nedu, India; all patients received multiple drugs therapy at an average of 3.632 drugs per patient. Short acting B2 against (SABA) were the most commonly prescribed group of anti-asthmatic drugs (68%) followed by methyl xanthenes (66%) anti histaminic (38.4%) leukotriene receptor antagonist (1.6%) and oral corticosteroids' (2.4%). Inhalational therapy was prescribed to 50.4% of patients.^[22]

One study conducted in University of Delhi in India selected randomly four asthmatic patients and identified anti asthmatic prescribing pattern. Patient A was prescribed with salbutamol, pridinisolone and hydrocortisone. Patient B was prescribed with salbutamol, aminophyline, pridinisolone and beclomethesone. The other patient C was prescribed with only salbutamol. Patient D take four anti asthmatic medications (salbutamol, aminophyline, pridinisolone and hydrocortisone). This study illustrates, salbutamol is the most prescribed drug for asthmatic patient and beclomethasone is the second prescribed one.^[26]

Research conducted in Hong Kong in contrast to Research in Saushatra and Comparable to Research in New Delhi University on the pattern of utilization in several developed countries oral anti-asthmatic agents (B2 agonist, specifically) were more commonly utilized

than inhaled drugs whereas absolute usage of anti-asthmatics increased by 79%; proportional inhaled usage increased by markedly especially of steroids (57%) in hospitals. This study showed despite prevalence of asthma more intensive; usage of anti-asthmatic drugs (especially inhaled steroids) was associated with declining asthma mortality.^[27]

One study from Canada underscores the problem of inappropriate medication use. Of 6254 asthma patients age 65 or older who were hospitalized for asthma, 2495 (40%) do not receive prescription for inhaled corticosteroid therapy which is the main stay of asthma control according to NHI guideline after follow up of 90 days post discharge.^[28]

In the United States a study found that 22% of the 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 benefit. The high antibiotic prescription in these setting is driven by lack of knowledge concerning asthma management guidelines. Clinicians interpret the cough that the patients present with as being a bacterial infection and therefore prescribe an antibiotic.^[29]

Double blinded clinical trial conducted in University of Ferra in Italy compared beclomethasone – formoterol maintenance therapy plus as needed salbutamol and beclomethasone – formoterol as both maintenance and as needed therapy. Of 326 severe exacerbations were reported by 251 patients during the study; 99 and 152 patients had at least one exacerbation during the 48 week 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 needed therapy.^[30]

The other study conduct in England demonstrated that patients with persistent, moderate-to-severe asthma (blood eosinophil count ≥ 300 cells/ μ L 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.^[31]

Asthma control researches done in South Africa reveals, among 1276 asthmatic patients, 855(67%) were well controlled and the others are poorly controlled. This study illustrate that only asthmatics who receive

combination 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.^[32]

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 hospitalization and hospital-based care for asthma as well as affects treatment outcome. 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 also induce pro-inflammatory cytokines or alter airway inflammatory cell phenotypes (e.g., increased neutrophils or reduced eosinophils), resulting in poorer asthma control.^[33]

A study done on asthma treatment in Nigeria illustrates, Sodium cromoglycate, aerosol isoproterenol, and aerosol salbutamol has been shown to improve ventilatory function in asthmatics. Several drug trials in Nigeria have demonstrated the effectiveness of the use of inhaled steroids, long-acting beta 2 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 in the management of acute asthma. There is inadequate documentation of vital information crucial to patient short-term and long-term care, frequent use of aminophylline, and inadequate 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 steroid, fear of side-effects, and inability to use the inhaler correctly have been shown to contribute to poor adherence.^[34]

The other asthma control research in Nigeria demonstrate that more than half of the patients used short acting β_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 β_2 agonist (LABA) was not common (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 had poor control, 14.3% were well-controlled and only 2.9% had total control of their asthma symptoms. Thus, 17.2% of patients had good control of their asthma (total score ≥ 20).^[35]

Study done In Uganda indicates that 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 commonest asthma symptom was wheezing. This study assesses that appropriate asthma treatment was low, both at the chest clinic and accident and emergency department but 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 steroid and beta2 agonist are more expensive than oral steroids and beta2 agonist. In the emergency department only 20.7% of the patients were nebulised and only 2.4% received nebulisation with oxygen despite the fact that nebulisation equipment and oxygen are available in the department most of the time. This finding could be due to lack of awareness on the part of the attending health workers.^[36,37]

Lee Pyetal in asthma control and prior medical are of patient presenting with acute asthma showed Salbutamol was the most prescribed drugs where 57 (81%) patients were using inhaled short acting Salbutamol but 21(31%) were still using oral short acting Salbutamol and only 32(46%) patients used inhaled corticosteroids.^[15]

Zuber Ahmed Motel (2008) analyzed relative and additional bronchodilator response of Salbutamol and ipratropium in smoker and non-smoker asthmatics. His study indicated non-smoker showed maximal response with Salbutamol alone. Ipratropium didn't give any significant additional benefit. In smoker asthma patients; neither of two drugs was able to fully dilate air ways. When given as second drugs both drugs caused further dilation. Ipratropium was more effective in smoker asthmatics when given as a sole agent or as second drugs.^[38]

Olga vachnoct al (2008) conducted a study on the novel combination inhaler for mild asthma treatment. He concluded budesonide (100mg) and Salbutamol (200mg) combination inhaler confirmed its efficacy and safety for mild asthma maintenance treatment. It can be used in the fixed, flexible or intermittent on demand damage intervals.^[39]

Dr. Tehseen Asharaf kohistan (2007) conducted a study on acute severe asthma and evaluated that the increase in PEFr over time as was significantly greater in combined ipratropium plus salbutamol group ($P=0.01$) also the proportion of admitted patients was less in combined salbutamol plus ipratropium bromide group 4/30 vs. 11/30 $p= 0.036$. He concluded that combined ipratropium bromide plus salbutamol rebulization alone and it should be used in the initial management of patients who present with acute severe asthma.^[40]

Asthma prevalence in eastern Africa is estimated at 4.4%, most of the asthma medications prescribers do not follow asthma management guidelines in many Low and Medium Income Countries .In Ethiopia the prevalence asthma is 9.1% as per PLOS medicine asthma in Africa, and In Jimma it is around 3.9% for those living with 150 meter of surface road and 3.7% for those living more than 150 meter away which is slightly less than Addis Abeba (11.4%).^[5,6,7]

2. OBJECTIVE OF THE STUDY

2.1 General objective

- To assess asthma pharmacotherapy among asthmatic patients in Medical Ward of Ghimbi General Hospital, West Wollega Zone, Oromia Region, Ethiopia.

2.2 Specific objectives

- To identify the common types of asthma diagnosed among adult patients.
- To assess appropriateness of asthma drug therapies among asthmatic patients in comply with standard guidelines.
- To describe commonly prescribed anti-asthmatic drugs in the hospital.
- To identify asthma exacerbating conditions that causes hospitalization.

3. METHODOLOGY

3.1 Study setting

The study was conducted in Ghimbi General Hospital (GGH), Ghimbi town, West Wollega zone, Oromia regional state, West Ethiopia which is found 441 km from Addis Ababa. GGH has different departments and wards like Outpatient department (OPD), medical ward, gynecology and obstetrics ward, pediatrics ward and surgical ward. It delivers diversified health services and clinics including the emergency services, mother and child health (MCH), laboratory, X-ray. The Hospital possesses outpatient, inpatient, and ART pharmacies.

The Hospital has eight General Practitioners (GP), one surgeon, forty nurses, five pharmacists, four druggist, seven mid wives and many administrative staffs.

The Hospital has a total of 173 beds in different wards. The Medical ward has 26 beds in both female and male medical ward. Two of the beds were in the private room. The Hospital give service for patients more than 17,000 every annually.

3.2 Study design and period

A retrospective cross sectional study involving patient card review was conducted in asthmatic patients who were attending Ghimbi Hospital for the past 6 months (October 1/2014 to April 1/2015).

3.3 Source population

All adult patients who were attending Ghimbi Hospital for the past 6 months (October 1/2014 to April 1/2015).

3.4 Study population

All adult asthmatic patients who were attending Ghimbi Hospital for the past 6 month (October 1/2014 to April 1/2015).

3.5 sample size and sampling technique

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

$$n = \frac{(Z\alpha/2)^2 \cdot P(1-P)}{d^2}$$

Where;

n = sample size

P = an estimate of proportion of asthmatic patients.

Z = the standard normal value at (1-) % confidence level and is mostly 5% i.e. with 95% Confidence level.

d = the margin of sample error tolerated.

So using the above formula, at 95% confidence level and margin of error 5% and p=50 %, d=5%.

$$n = \frac{(Z\alpha/2)^2 \cdot P(1-P)}{d^2}$$

$$n = \frac{(1.96)^2 \cdot 0.5(1-0.5)}{(0.05)^2}$$

$$n = \frac{(1.96)^2 \cdot 0.5(0.5)}{(0.05)^2}$$

$$n = 384$$

Using sample reduction formula, the sample size was determined based on study population as follows:

The total number of asthmatic patients who had visited the hospital were 450.

$$nf = \frac{n}{1 + n/N}$$

$$nf = \frac{384}{1 + 384/N}$$

Where nf = sample size included in the reviews

N = study population

$$NF = 384/1 + 384/450$$

$$NF = 210$$

The total number of asthmatic patient during study period was 217. But 7 of the patients medical record has no full information. Convenient sampling method was used to select study subject for this study

3.6 Inclusion and exclusion criteria

3.6.1 Inclusion criteria

All adult asthmatic patients who were attending Ghimbi General Hospital during the study period.

3.6.2 Exclusion criteria

- Those patients who had started treatment one month before study period.
- Incomplete asthmatic patients profile form (medical Records)
- All patients less than 15 years who were attending Ghimbi General Hospital for the past 6 months.

3.7 Study Variables

3.7.1 Dependent variables

Prescribing pattern of anti- asthma medication
Asthma exacerbation and hospitalization

3.7.2. Independent variables

- Age
- Sex
- Concurrent medications
- Anti- asthma medications
- Prevalence of asthma

3.8 Data collection process

A well-structured data collection format containing the variables to be measured was designed, developed and utilized by the principal investigator or data collector after permission obtained from GGH. The data were collected for each patient until discontinuation of anti-asthmatic, patient discharged from the hospital, referred to other area or patient died only in the predetermined range of study period. Before starting actual data collection, a pre-test was done on the questionnaires for having full required information of the study and to maintain quality of the study.

The clarity and completeness checkup of data collection formats was under taken before the actual data collection and data clearing was done every day, formats with insufficient information were excluded from the study to avoid error. Then collected data was processed and retained cautiously in the line of its objective.

3.9 Data processing and analysis

Once all necessary data were obtained, data are checked for completeness, sorted and categorized accordingly. Then the data processed, analyzed and interpreted. A descriptive statistics was done to describe the results in line with the specific objectives of the study. The final result was compared with the standard criteria and was presented using tables, diagrams and various graphs.

3.10 Ethical considerations

A formal letter was written from Collage of medical and Health science, Department of pharmacy, Wollega University to GGH in order to get permission to conduct the study.

Staff members of Medical ward of GGH including the physician, HOs, Nurses and other health care providers, permission for any cooperation will be politely asked. The confidentiality of patients was secured throughout

the study periods without writing full patient names by using codes.

3.11 Operational definitions

- **Anti-asthmatic drugs:** are medications which reverse bronchi-constrictions, reduce inflammation and decrease inflammatory cells movement to lung sacs.
- **Appropriate drugs use:** rational utilization of drugs in suitable dose regimen, at the lowest price and with ease according to the clinical findings and personal characteristics to their clinical needs.^[22]
- **Asthma:** is a chronic reversible airway obstruction characterized by cough, shortness of breath, chest tightness, wheezing and rapid respiration.
- **Asthma symptom-** is symptom produced due to asthma and asthma exacerbation such as chest tightness, cough, wheezing and shortness of breath.
- **Co morbid diseases** – are diseases the patient is living together with asthma through the live of the patient.
- **Concurrent:** is ongoing monitoring of drug therapy during course of treatments.
- **Drug interactions:** is interaction which may occur between drugs which compete for the same receptors or compete for the same enzyme.
- **Drug use evaluation:** is a continuing systematic process deciding to maintain the appropriate and effective use of drugs.
- **Precipitating diseases-** are those diseases that are responsible for immediate asthma exacerbation and precipitate asthma attack but does not live for long period of time.
- **Prescription:** is an instruction from a prescriber to dispenser.
- **Rational use of drugs:** is a process of involving appropriate prescribing, dispensing, and patient use of drugs.
- **Well controlled asthma** – is defined as using of the rescue bronchodilator medications 2 days or, less per week for symptom control. (Annex-2).

4. RESULTS

4.1. Socio-demographic characteristics of the patients

From a total of 210 studied asthmatic patients, 113(53.8) were female and 97(46.20%) were male with a male to female ratio of approximately 1:1.2. The majority of patients were found between age 35-44 which account 73(34.76%) followed by age between 45-54 which account 54(25.7%), age between 25-34 which account 28(13.3%), age >65 which account 23(10.95%) and the least age between 15-24 which account only 19(9%). The mean age of the participants was 43.25(±12.6 years). Majority of the patients didn't use social drug which account 194(92.4%) followed by alcohol, tobacco and chat which account 5 (2.4%), alcohol only which account 4(1.9%), tobacco only which account 3(1.4%), alcohol chat 2(0.95%) and tobacco only 2(0.95%).

Table 1: Socio-demographic characteristic of asthmatic patient at Medical ward of Ghimbi General Hospital, March 01, - April 01/2015.

Characteristics	Status	N=210 N (%)
Sex	Male	97 (49.5)
	Female	113(50.5)
	Total	210 (100)
Age interval	15 -24	19(9)
	25-34	28(13.33)
	35-44	73(34.76)
	45-54	54(25.71)
	55-64	13(6.19)
	>64	23(10.95)
Total		210(100)
Social Drug Use	None	194(92.38)
	Alcohol only	4(1.90)
	Chat only	2(0.95)
	tobacco only	3(1.40)
	Alcohol, tobacco and chat	5(2.38)
	Alcohol and chat	2(0.95)
	Total	

4.3. Patients Clinical Conditions

4.3.2. Co morbidities and precipitating diseases of asthmatic patients

About 38.6% of the patients had no known documented precipitating conditions. For those who had documented reasons, the three most common asthma precipitating diseases were community acquired pneumonia (23.3%), dyspepsia (18.6%) and urinary tract infection (15.2%) in their order of rank. Only 12% of asthmatic patients have chronic diseases while the others have no documented chronic co morbid diseases.(Table 2).

Table 2: Precipitating disease of asthmatic patient at Medical Ward of Ghimbi General Hospital, March-April.1/2015.

S. No.	Precipitating disease	N=210N (%)
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	URTI	4 (1.90)
	Total	210(100)

Table 3: Co morbid disease of asthmatic patient.

S. No.	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)
6	Dermatological disorder	2 (0.95)
7	Toxic Nodular Goiter	2 (0.95)
	Total	210 (100)

At Medical Ward of Ghimbi General Hospital, March01-April 01/2015

Dermatological disorder: melasema, dermatitis and skin rash

4.2. Prevalence of Asthma

From a total of 210 patients; 107(50.95%) of patients were diagnosed with intermittent type of asthma and 103(49.05%) were diagnosed with persistent type of asthma.

Moreover, from the total 103 patients diagnosed with persistent asthma; 41(39.80%) had a mild persistent asthma, 52(50.48%) had a moderate persistent asthma, and 10(9.70%) had a severe persistent asthma when categorized as per NAEPP asthma severity grades.^[3]

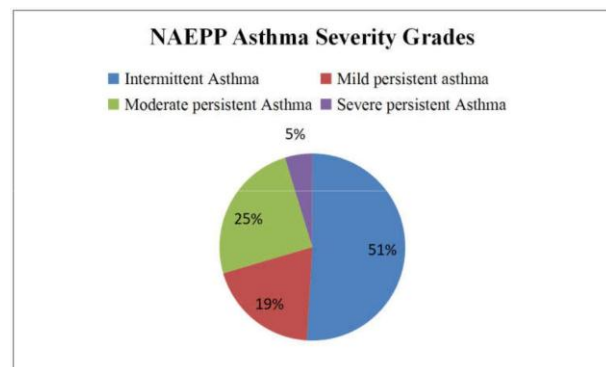


Figure 1: PIE CHART: Asthma severity grades and their frequency in Ghimbi General Hospital Medical ward from March 01-april 01/2015.

4.3.1. Asthma Symptoms manifested by the patients

Among asthmatic patients hospitalized in Medical Ward of GGH; about 205(31.9%) of them manifested cough, 185(28.8) of them manifested SOB,144(22.4%) of them manifested Wheezing, 83(13.8%) of them manifested other symptoms such as palpitation, sweating, fever, nausea, vomiting etc and only 26(4.0%) of them manifested chest tightness.(Table 4).

Table 4: Asthma symptoms manifested during hospital visit among asthmatic patient at Medical Ward of Ghimbi General Hospital March 01-April 01/2015.

S. No.	Asthma Symptom at Hospital visit	Frequency	Percent (%)
1	Wheezing	144	22.4
2	Cough	205	31.9
3	Shortness of Breath	185	28.7
4	Chest Tightness	26	4.0
5	Other symptoms	83	12.9
	Total	643	100

From 210 asthmatic patients 67.6% of them had asthma exacerbation while 32.4% of them not.

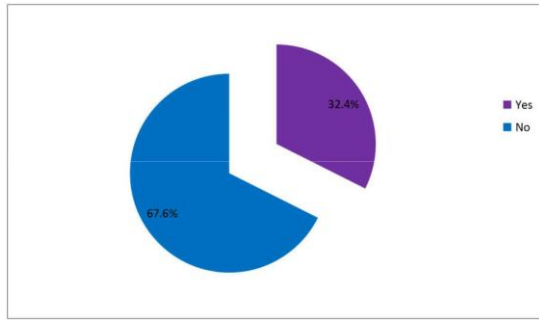


Fig 2: Asthma exacerbation among asthmatic patient at Medical Ward of Ghimbi General Hospital, March01-April01/2015.

Most patients were hospitalized other than asthma symptom related (60.29%).

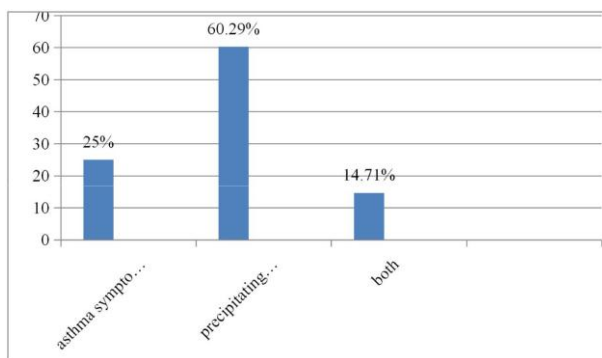


Figure 3: Cause of hospitalization among asthmatic patient at Medical Ward of Ghimbi General Hospital March01-April01/2015.

4.4. Prescribing pattern of anti-asthma drugs

Most of the patients received corticosteroids class of anti-asthmatic drugs which holds 196(46.9%) followed by SABA which holds 167(39.95%),Methyl xanthine derivatives accounts 30(7.17%) and anti-histamine holds only 25(5.98%).From 210 studied asthmatic patient, 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 hydrocortisone 50(23.8%). (Table5).

Table 5: The Prescription pattern of anti- asthmatic drug class among asthmatic patient at Medical Ward of Ghimbi General Hospital, March 01-April01/2015.

Asthma Drug Class	N=210 (%)
SABA	167 (39.95)
Corticosteroids	196 (46.88)
Methyl Xanthine derivatives	30 (7.17)
Anti-histamine	25(5.98)
Total	418 (100)

Patients who were treated with different regimens of anti-asthmatic drugs were 210. The numbers of patients who were treated with mono-therapy of anti-asthmatic drugs were 78(37.14%). From anti-asthmatic combinations, two drugs combinations were prescribed for 62(29.52%) patients, three drugs combinations were prescribed for 64(30.47%) and four drugs combinations were prescribed for 6(2.85%) asthma patients.(Table 6).

Table 6: Prescribed anti-asthmatic drugs regimen (single/multiple drug regimen) medical ward of Ghimbi General Hospital from March 01 to April 01/2015.

No	Drug therapy	Frequency	Percent
1	Single	78	37.14
2	Two	62	29.52
3	Three	64	30.47
4	Four	6	2.85
	Total (per patient card)	210	100

A total of 418 anti-asthmatic drugs were prescribed with three routes. From these routes oral route constituted high percentage 225(53.82%) followed by parenteral which accounted 128(30.62%) and inhalational route accounted 65(15.55%). From individual drug used in different dosage showed by this study was salbutamol where its accounted was 102 and its inhalational accounted 65. Orally given drugs were salbutamol 102 followed by prednisolone 89, Almethamin 15,Cetirizine 10 and theophedrine 9. From parenterally given drugs 107 hydrocortisone and 21 aminophylline were prescribed. Inhalational given drugs were 65 salbutamol only.(Table 7).

Table 7: Commonly used anti-asthmatic drugs and their route of administration in medical ward of Ghimbi General Hospital from March 01-April 01/2015.

No	Drugs	Po(no)	Parenteral(no)	Inhalational(no)	Total	Percent
1	Salbutamol	102	0	65	167	39.95
2	Prednisolone	89	0	0	89	21.29
3	Hydrocortisone	0	107	0	107	25.59
4	Cetricizine	10	0	0	10	2.39
5	Aminophylline	0	21	0	21	5.02
6	Almethamin	15	0	0	15	3.60
7	Theophedrine	9	0	0	9	2.15
	Total (%)	225(53.82%)	128(30.62%)	65(15.55%)	418	100

Anti-asthmatic combinations/regimens were classified into initial therapy and maintenance therapy. In initial therapy, the most prescribed anti-asthmatic combination/regimen was salbutamol puff + hydrocortisone which accounted 51(42.85%) followed by salbutamol puff + prednisolone constituted 42(35.29%), aminophylline+ salbutamol+ hydrocortisone 17(14.28%), and aminophylline + salbutamol + prednisolone + hydrocortisone which accounted 2(1.68%).

In maintenance therapy, salbutamol + prednisolone constituted 67(69%) followed by salbutamol + Theophrine which accounted 5(8.25%) and Prednisolone + theophrine accounted 3(6.19%).(Table 8)
 Table 8: Commonly used anti-asthmatic drugs regimens, No of drugs in the regimen and their frequency in medical ward of Ghimbi General Hospital from March 01-April 01/2015.

	No	Anti-asthmatic Regimens	Frequency	Perpercent
Initial therapy	1	Aminophylline + hydrocortisone	7	5.88
	2	Salbutamol puff + hydrocortisone	42	35.29
	3	Aminophylline + salbutamol puff + hydrocortisone	17	14.28
	4	Aminophylline + salbutamol puff + Prednisolone + hydrocortisone	2	1.68
	5	Salbutamol puff +prednisolone	51	42.85
		Total	119	100
Maintenance therapy	1	Salbutamol tablet + prednisolone	83	69.07
	2	Salbutamol + Theophrine	5	8.25
	3	Prednisolone + theophedrine	3	6.19
		Total	91	100

4.5. Appropriateness of Anti-asthma Drug Therapy

Anti-asthmatics were prescribed appropriately or inappropriately for treatment of asthma. During initial therapy, 59.8% of intermittent asthma patients were treated appropriately. While 40.2% were treated inappropriately. 68.3% of persistent mild asthma patients were treated with appropriate while 31.7% of them were treated inappropriately. 78.8% of Persistent moderate asthma and 21.2% of them were treated with inappropriate anti-asthmatic drug regimens. 60 % of persistent severe asthma patients were treated with appropriate and 40% persistent severe asthma patients were treated with inappropriate anti-asthmatic drug regimens. (Table 9).

During maintenance therapy, 73.8% of intermittent asthma patients were treated appropriately while 26.2% were treated inappropriately. 90% of persistent mild asthma patients were treated with appropriate anti-asthmatic drugs while 10% of them were treated inappropriately. 86.5% of persistent moderate asthma were treated appropriately while 15.5% of them were treated inappropriately. 70% of persistent severe asthma patients were treated with appropriate while 30% of them were treated with inappropriate anti-asthmatic drugs/regimens. (Table 9).

Table 9: appropriateness and inappropriateness of prescribed anti-asthmatic drugs in treatment of asthma severity grades in Medical Ward of Ghimbi General Hospital from March 01-April 01/2015.

No.	Asthma severity grades	Initial therapy		Maintenance therapy	
		Appropriate	Inappropriate	Appropriate	Inappropriate
1	Intermittent	64	43	79	28
2	Persistent mild asthma	28	13	37	4
3	Persistent moderate asthma	41	11	45	7
4	Persistent severe asthma	6	4	7	3
	Total	139	71	168	42
	Reference:Annex-2				

From 418 anti-asthmatic drugs given for 210 patients, 389(93.1%) anti-asthmatics were prescribed with appropriate dose, 30(7.2%) were given with inappropriate dose and 9(2.3%) doses of anti-asthmatic drugs were not indicated. This also frequency pattern of these 418 anti-asthmatic drugs, 354(84.68%) drugs were given with appropriate frequency, 54(12.9%) drugs were

given with inappropriate frequency and frequency of 20(4.8%) drugs was not indicated. The other dose regimen this table indicated was duration of anti-asthmatic drugs. 304(72.7%) drugs were prescribed with appropriate duration, 36(8.6%) were prescribed with inappropriate duration and 78(18.6%) of duration of drugs was not indicated.(Table 10).

Table 10: Commonly used anti-asthmatic drugs and appropriateness and inappropriateness of their dose regimens in Medical Ward of Ghimbi General Hospital from March 01-April 01/2015.

No	Drugs	Dose (No)			Frequency(No)			Duration(No)		
		Ad	Id	Nid	Af	If	Nif	Au	Iu	Nif
1	Salbutamol	153	5	9	117	32	18	101	4	62
2	Prednisolone	77	12	0	82	7	0	67	22	0
3	Hydrocortisone	112	12	0	114	10	2	103	3	10
4	Cetricizine	2	0	0	2	0	0	1	0	1
5	Aminophylline	18	1	0	13	5	0	14	2	2
6	Almethamin	15	0	0	15	0	0	7	5	3
7	Theophedrine	12	0	0	11	0	0	11	0	0
Total (%)		389	30	9	354	54	20	304	36	78
Keywords:										
	Ad- appropriate dose	af -appropriate frequency			au-appropriate duration					
	Id- inappropriate dose	if -inappropriate frequency			in-inappropriate duration					
	Nid-not indicated dose	nif-not indicated frequency			niu-not indicated duration					

Table 11: Concurrent medication prescribed among asthmatic patient at Medical Ward of Ghimbi General Hospital, March01-April01/2015.

S.N	Concurrent medications	N=210 N (%)
1	No concurrent medication	80(38.09)
2	Antibiotics	118 (56.19)
3	Drugs for 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	Ati-thyroid	2 (1)

- ✓ Antibiotic include: Doxycycline, ceftriaxone, anti-TB medications, augment, claritromycin, Ciprofloxacin, erythromycin, metronidazole, Chloramphenicol, amoxicillin, crystalline penicillin.

- ✓ Drugs for GERD and dyspepsia: antacid, omerprazole and cimetidine.
- ✓ Cardiac medications: spiranolactone, digoxin, HCTZ, atenolol, propranolol, frusemide, enalapril.
- ✓ Anti-pain medications: ASA, diclofenac, paracetamol and ibuprofen.
- ✓ Oral contraceptives.
- ✓ Anti-histamine: loratidine and citrizen.
- ✓ CNS drugs: amytriptline.

Anti-asthmatic drugs were prescribed with 20 interacting drugs. From these interacting drugs, they were prescribed with 11 antagonists and 9 synergists. This table also indicated Level of their interaction between anti-asthmatic drugs and interacting drugs. These Anti-asthmatic drugs were prescribed with 9 majorly and 11 moderately interacting drugs. Salbutamol was given with 9 interacting drugs; corticosteroids were also prescribed with 9 interacting drugs and aminophylline was administered with 2 interacting drug(Table 12).

Table 12: Anti-asthmatic drugs and interacting drugs concurrently utilization pattern and their frequency in Medical ward of Ghimbi General Hospital from March 01-April 01, 2015.

No	Anti-asthmatic Drugs	Interacting drugs	Effect	Level of interaction	Frequency
1	Salbutamol	Atenolol	Antagonism	Major	3
2	Salbutamol	Non k+-sparing diuretics	Synergism	Moderate	3
3	Salbutamol	Coartem	Synergism	Major	1
4	Salbutamol	Aspirin	Antagonism	Major	1
5	Salbutamol	Quinine	Synergism	Moderate	1
6	Corticosteroids	Non-sparing diuretics	Synergism	Moderate	6
7	Corticosteroids	Lente insulin	Antagonism	Major	2
8	Corticosteroids	Atenolol	Antagonism	Major	1
9	Aminophlline	Phenobarbitone	Antagonism	Major	1
10	Aminophylline	Atenolol	Antagonism	Moderate	1
Total		11 antagonisms + 9 synergisms		9 majors + 11 moderates	20

Anti-asthmatic drugs were prescribed to their contraindicated diseases. According to results from the following table anti-asthmatic drugs were prescribed 36 times to their contraindicated diseases. From these, salbutamol was given 5 times with hypertension and 1

heart failure. 11, 8, 3, 2 corticosteroids were prescribed to hypertension, PUD, TB and RVI and DM respectively. 4 theophyllines were prescribed to PUD, one aminophylline to epilepsy and as well to hypertension were prescribed.(Table13)

Table 13: Prescribed anti-asthmatic drugs to their contraindicated diseases in medical ward of Ghimbi General Hospital from March 01-April 01, 2015.

No	Anti-asthmatic drugs	Anti-asthmatics contraindicated diseases	Frequency
1	Salbutamol	Hypertension	5
2	Salbutamol	HF	1
3	Corticosteroids	Hypertension	11
4	Corticosteroids	PUD	8
5	Corticosteroids	DM	2
6	Corticosteroids	TB and RVI	3
7	Theophyllines	PUD	4
8	Aminophylline	Epilepsy	1
9	Aminophylline	Hypertension	1
		Total	36

According to result from this study different drug therapy Problems were identified. More over the most drug therapy problem was adverse drug reaction accounted 36(28.3%) followed by need additional drug

therapy 26(20.5%), dosage too low 23(18.1%), ineffective drug therapy 18(14.2%), unnecessary drug therapy 15(11.8) and dosage too high 9(7.1%). (Table 14).

Table 14: Type and Category of Drug Therapy Problem identified in medical ward of Ghimbi General Hospital from March 01-April 01, 2015.

S. No.	Drug Related Needs	Category of Therapy Problem	Drug	Frequency	Percent
1	Indication	Unecessary Therapy	Drug	15	11.8
		Need Additional Therapy	Drug	26	20.5
2	Effectiveness	Ineffective Therapy	Drug	18	14.2
		Dosage too Low		23	18.1
3	Safety	Dosage too High		9	7.1
		Advese Drug Reaction		36	28.3
		Total		127	100

DISCUSSION

Most of the patients diagnosed with asthma were in the 34-44 age groups (34.76%). This is inconsistent with findings done In Uganda, 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.^[19,20,21] Study done in Tamil Nadu, India showed 62(49.6%) of the patients were male and 63(50.4%) were women from 125 asthma patients.^[8] In both researches the number of female was greater than that of male, which was not different with my study that is; female to male ratio was 1.2:1.

The most prescribed anti-asthmatic drugs was salbutamol 167(39.95%) followed by hydrocortisone 126(30.14 %), prednisolone 89(21.29%), aminophylline 18(4.3%). Research done in Quebec, Canada in 2008 and research conducted in Saushatra region in India showed that salbutamol was the most prescribed anti-asthmatic drug.^[30,1] Salbutamol is chosen as the first line agent in the management of asthma where it is used for relief of acute exacerbation asthma symptoms breathlessness and wheezing and maintenance therapy in its tablet and inhalational dosage. This might increase its utilization.

Even though many studies didn't show that hydrocortisone was commonly prescribed, they have indicated that it is frequently prescribed drug for acute exacerbation of persistent severe asthma especially static asthmaticus (annex-2). They are not in contrast to this study which found that hydrocortisone was the second most prescribed anti-asthmatic drugs because there were 10 persistent severe asthma patients.

The third among commonly prescribed anti-asthmatic drugs in this study was Prednisolone like study done in Kedah, Malaysia^[29] and many other researches. Research conducted in Saushatra region in India revealed that corticosteroids were found to be through mono-therapy and combination-therapy.^[1] However potential adverse effect associated with corticosteroids restricted to their use as compared to SABA. Prednisolone is the most effective anti-inflammatory medications for the treatment of persistent asthma. It has high efficacy in reducing asthma symptoms, improving quality of life, improving lung function, decreasing airway hyper responsiveness, controlling airway inflammation, reducing frequency and severity of exacerbation and asthma mortality rate. This might increase its utilization.

Aminophylline was not frequently prescribed anti-asthmatic drugs in many studies in which is the same to this study. Study done by Anil Kumar et al and Awanish Pandey et found it was frequently prescribed drugs. Aminophylline is weak bronchi-dilator so that prescribed with salbutamol which is the most effective bronchodilator especially in mild to moderate asthma. WHO guide line has mentioned weak bronchodilator effect of Aminophylline makes it to be used with other strong bronchodilators such as salbutamol (annex-2). This might decrease its utilization in other countries. In this they started challenging acute exacerbation of asthma with it. This was found a great drug problem in treatment of asthma such as poly-pharmacy.

Combinations of anti-asthmatics are prescribed for relief of acute asthma symptoms and to control chronic asthma. In this study for initial therapy, 119 common combinations were prescribed. The most combined anti-asthmatic drugs were salbutamol puff and hydrocortisone accounted 51 (42.85%), followed by salbutamol puff + prednisolone constituted 42(35.29%), aminophylline + salbutamol + hydrocortisone 17(14.28%), and aminophylline + salbutamol + prednisolone + hydrocortisone which accounted 2(1.68%).

Research conducted in Kedah Malasia ipratropium and salbutamol puff combination (combivent) was the most commonly prescribed anti-asthmatic combination for treatment of acute exacerbation of asthma (29). The difference between researches is ipratropium unavailability in this hospital. But according to WHO guideline, hydrocortisone and Aminophylline should not be given together because hydrocortisone is anti-inflammatory and aminophylline is weak bronchodilator so that their combination is not effective to provide immediate relief for acute exacerbation of asthma which needs reversible of bronchi spasm (annex2).

In maintenance therapy, frequently prescribed anti-asthmatic drug combinations was salbutamol tablet and prednisolone constituted 67(69.07) from 91 total combined anti-asthma drugs. But, research done in kedah, malasia^[29] frequently prescribed combinations were symbicort (budesonid and formeterol) and seretide (salmeterol and fluticasone). Still the difference is unavailability of drugs. Symbicort is mono-component, lower costs and control of asthma symptoms is improved or achieved with reduced total dose administration with symbicort. It is right combination but it is better to use inhalational salbutamol irregularly to reduce side effect and prednisolone should not prescribed for not more than 15 days to prevent its side effects and its dose should be tapered.

This research identified anti-asthmatic drugs classes and assessed which anti-asthmatics classes were prescribed more frequently. Accordingly, corticosteroids were the most frequently prescribed anti-asthmatic class followed by SABA, methyl xanthenes, and anti-histaminic. In

many researches (Tomas Jarti, Kedah in Malasia), corticosteroids were the most common prescribed anti-asthmatic class followed by SABA, leukotriene modifiers and methyl xanthenes.^[11,29] They are almost the same with this research but in the second frequently prescribed class were methyl xanthenes in this study it might be due to leukotriene receptors are not available in Ghimbi General Hospital.

Corticosteroids especially inhaled corticosteroids are the preferred first line controller therapy for mild to moderate persistent asthma. They are considered the standard daily preventive treatment as they show decrease in frequency and asthma episodes as well as the risk of asthma hospitalization. This could be because they inhibit many components of the asthma inflammatory response.

SABA are still highly preferred for asthma since they are the most effective bronchodilator which provide quick or rescue relief from acute exacerbation of asthma.

This study indicated that anti-asthmatic drugs were frequently given orally which accounted 225(53.82%) followed by parenteral 128(30.62%) and inhalational 65(15.55%). This result was quite different from research conducted in Tamil Nadul; India which indicated inhalational accounted 50.4% of patients received inhalational therapy.^[18] This difference might be due to patient low level of acceptance apart from non-compliance and co-ordination associated with the use of inhaler, physician prescription, and unavailability of other inhaler drugs. As well as salbutamol tablet was prescribed more than inhalational salbutamol in study. Lee Pyetal showed 57 (81%) patients were using inhaled short acting salbutamol but 21(31%) were still using oral short acting salbutamol. This shows prescribers in Ghimbi General hospital didn't know the benefit of salbutamol tablet over inhalational.^[23]

Inhalational form is the most safe and cost effective therapy in bronchial asthma. The advantage being smaller dose, targeted delivery, rapid action and minimal systemic side effects increase its utilization. Oral medication are necessary in patients who don't comply to the inhalational where he or she is unable to use inhaler therapy effectively especially in the group of pediatric and geriatric mainly coordinating the beginning of inspiration with actuation of the inhaler. Parenteral administration of anti-asthmatic drugs are also used when there is an emergency of asthma attack and to prevent the side effect of irritation on respiratory tract.

NAEPP has classified asthma into three; intermittent asthma, persistent mild, persistent moderate and persistent severe asthma. During their diagnosis physicians clearly identified types of asthma but their weakness was on treatment. From 210 asthma patients 107(50.34%) were intermittent asthma patients, 8(5.37%) were persistent mild asthma patient,

28(18.79%) were persistent moderate asthma patients, 10(7.50%) were persistent severe asthma patients. In my study, asthma affected anti-asthmatic drugs utilization. Mono-therapy was prescribed for treatment intermittent asthma and persistent mild asthma. But, for treatment of severe and moderate combinations of anti-asthmatics were mainly prescribed. Doses, frequency and duration of anti-asthmatics were increased in treatment of severe and moderate asthmas. This was mainly seen with maintenance therapies specifically theophyllines and prednisolone.

According to WHO guideline (annex 2) asthma severity grades are treated by different drugs, drug combinations, dose regimens. This study identified how anti-asthmatics were used in treatment of asthma types. During initial therapy, patients who were prescribed with appropriate drugs/regimens were 90 and with inappropriate drugs/regimens 59. During maintenance therapy, 132 patients were prescribed with appropriate and 17 patients were not prescribed with appropriate drugs/regimens. Inappropriate prescription was seen mainly during initial therapy this might be due to physician started challenging acute exacerbation of asthma with aminophylline which is not accepted by WHO (annex 2). The reason behind these problems might be due to poor physician performance, unavailability of other drugs, following Ethiopia STG, lack of money and drugs were available at home. Secondly, these problems were seen on treatment of persistent moderate and severe asthma. This might be due to many patients came with them in addition to the above reasons.

Depending on WHO guideline (annex 2) dose regimens of these drugs were evaluated by this study. Accordingly, 389 doses, 354 frequencies and 304 durations of anti-asthmatics were prescribed appropriately. 30 doses, 54 frequencies and 36 durations were prescribed inappropriately and 9, 20 and 78 drugs' doses, frequencies and durations were not indicated respectively. These might be due to poor physician performance, mistake and forgetting during writing on patient cards, following Ethiopian STG. Non-indication of dose regimens was mainly seen during initial therapy.

Based on annexes 2, Anti-asthmatics were prescribed 20 times with interacting drugs from which 11 were antagonists and 9 were synergists. These identified interacting drugs have moderate to major interaction level with anti-asthmatics. Majorly interacting drugs were seen 9 times and moderately interacting drugs were found 11 times. The most clinically significant interactions found by this study were interaction between salbutamol and atenolol 3 times, salbutamol and aspirin 1 times, corticosteroids and lente insulin 1 times. This prescription of interacting drugs might be due to poor physician performance, seeing benefit-risk ratio interacting drugs, unavailability of other non-interacting drugs.

Major interaction is clinically significant and they should not be given together regardless of benefit-risk ratio. Moderate interaction is also clinically significant but can be prescribed together identifying benefit-risk ratio.

Depending on annexes 2, this study also found 36 anti-asthmatic drugs were prescribed to their contraindicated diseases. Salbutamol was prescribed in presence of HTN and HF. Corticosteroids were given to HTN, PUD, DM, TB and RVI. Aminophylline to epilepsy, theophyllines to PUD were prescribed. These problems might be also because of poor physicians and health practitioners' performance, unavailability of non-contraindicated drugs, finding benefit- risk ratio and patients' inability to afford money to non-contraindicated drugs.

In this study, 25.6% of asthmatic patient's precipitants for asthma exacerbation were lower and upper respiratory infection. This was supported by the study done in United States which found that 22% of the patients with acute asthma were treated with an antibiotic. This suggests that most precipitating diseases are infection related. This might be due to health professional interpretation of acute asthma symptom to symptom of respiratory infection.

14.76% of the patients routinely used only SABA either orally or inhaled for the long-term control of asthma. This is lower when compared with the result from the studies done in Nigeria (57%).^[18]

Despite GINA guideline, the most asthma drug combination is SABA + prednisolone for which 39.54% of patients received for long term asthma control. This study conforms with the study done in Nigeria for which 41% of the patients took oral corticosteroid for long term asthma control.^[17] This might be due to high cost of ICS and poor adherence of physicians to the guide line.

ICS are currently the most effective anti-inflammatory medications for the treatment of persistent asthma. Studies have demonstrated their efficacy in the long-term management of persistent asthma.^[11] only 45.7% of patients used inhaled corticosteroids combination with other drug in this study. This low utilization of inhaled steroids is supported by data from studies in Nigeria which is 38%.^[18] In contrast with GINA guideline there was no patient using ICS+LABA or LABA only. This no utilization of ICS might be due to poor adherence to STG.

In this study, it was found that 56.19% patients were prescribed for antibiotics for management of upper and lower respiratory and urinary tract infection. This is inconsistent with the studies done in United States for which 22% of patients with acute asthma were treated with an antibiotic. This higher antibiotic prescription might be due to health professional interpretation of acute asthma symptom to symptom of bacterial respiratory infection.

The types of medication used for asthma therapy and comorbid and precipitating diseases are the major determinant of treatment outcome. This study has demonstrated that despite the availability of effective therapy for asthma, the control of asthma is sub-optimal among asthma patients visit at Medical Ward of Ghimbi General Hospital and falls short of the GINA guideline recommendations. 56.2% of the patients had poorly controlled asthma. The result of this study is inconsistent with data from previous survey in a survey of asthma patients in Uyo Nigeria observed poor control among 80% of the patients with a significant association between under- utilization of ICS and the use of systemic steroids with uncontrolled asthma.^[18]

Limitations of the study

This study had notable limitations. First, the retrospective nature of the study limited us to examine factors that predict outcome variables in a robust manner. Second, it did not investigate factors that were predictors for poor asthma symptom control. Third it didn't identify treatment outcomes of asthmatic patient.

6. CONCLUSION

In this study, the most prescribed anti-asthma drug was salbutamol followed by hydrocortisone, prednisolone and aminophylline.

During initial therapy, commonly prescribed combinations of anti-asthmatic drugs for treatment asthma were salbutamol puff + hydrocortisone followed by salbutamol puff + prednisolone constituted, aminophylline + salbutamol + hydrocortisone and aminophylline + salbutamol + prednisolone + hydrocortisone.

In maintenance therapy, frequently prescribed anti-asthmatic drug combinations were salbutamol tablet and prednisolone.

Corticosteroid which contains hydrocortisone and prednisolone were the most frequently prescribed anti-asthmatic class followed by SABA (salbutamol), methyl xanthenes includes Aminophylline and theophedrine and histaminic (Cetricizine). This study indicated that anti-asthmatic drugs were frequently given orally followed by parenteral and inhalational.

During initial therapy and maintenance therapy patients were prescribed with appropriate drugs/regimens and dose regimens as well as with inappropriate drugs/regimens and dose regimens. These might be due to poor physician performance, mistake and forgetting during writing on patient cards, following Ethiopian STG. Non-indication of dose regimens was mainly seen during initial therapy.

All patients who have taken anti-asthmatic were asthma patients. Most of them were intermittent asthma patients followed by persistent moderate asthma patients,

persistent mild asthma patients, and persistent severe asthma patients. In study Asthma types were the most factor affected anti-asthmatic drugs utilization from factors affecting anti-asthmatics listed by NAEPP 2012.

Anti-asthmatics were prescribed with interacting drugs from which most of them were antagonists and some of were synergists. This study also found 36 anti-asthmatic drugs were prescribed to their contraindicated diseases.

RECOMMENDATIONS

Ghimbi General Hospital health professionals should at least follow Ethiopian STG because this study indicated that some of them didn't follow either WHO guide line or STG.

Further prospective, observational should be conducted to identify more problems with anti-asthmatics utilization in Ghimbi General Hospital by minimizing limitation encountered me.

Ghimbi General Hospital physicians and health care professionals should write all drugs and patient related information to suit for further conducted studies..

Clinical pharmacists, physicians, Ghimbi General hospital and ministry of health should work together to minimize problems identified by this study because patients were treated with ineffective drugs in presence of effective drugs which lead to poly-pharmacy and inappropriate dose regimens.

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