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BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEATH SIENCES

SCHOOL OF MEDICINE DEPARTMENT OF INTERNAL MEDICINE

Inhalational Corticosteroid Underutilization And Asscociated Factors Among Bronchial Asthma Patients Visiting At Public Hospitals In Bahir Dar City, Northwest Ethiopia

BY: Addisu Bitew (INTERNAL MEDICINE.R3)

FUBRARY, 2024

BAHIR DAR, ETHIOPIA

BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEATH SIENCES

SCHOOL OF MEDICINE

DEPARTMENT OF INTERNAL MEDICINE

INHALATIONAL CORTICOSTEROID UNDERUTILIZATION AND ASSCOCIATED FACTORS AMONG BRONCHIAL ASTHMA PATIENTS VISITING AT PUBLIC HOSPITALS IN BAHIR DAR CITY, NORTHWEST ETHIOPIA

THESIS SUBMITTED TO BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCE DEPARTMENT OF INTERNAL MEDICIENE IN PARTIAL FULLFILMENT OF THE REQUIRMENT FOR SPECIALITY PROGRAM FOR INTERANL MEDICIENE

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FEBURARY, 2024

BAHIR DAR, ETHIOPIA

Declaration

This is to certify that the thesis entitled "Inhalational Corticosteroid underutilization and; associated factors among Bronchial Asthma patients visiting at Public hospitals in Bahir Dar city, Northwest Ethiopia" submitted in partial fulfillment of the requirements for Specialty program for Internal Medicine in Bahir Dar University College of Medicine and Health Science department of Internal Medicine, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Addisu Belew A — 12/07/2016 — _____

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Approval of Dissertation/thesis for defense

I hereby certify that I have supervised, read, and evaluated this thesis/dissertation titled "Inhalational Corticosteroid underutilization and associated factors among Bronchial Asthma patients visiting at Public hospitals in Bahir Dar city, Northwest Ethiopia" by Addisu Bitew prepared under my guidance. I recommend the thesis/dissertation be submitted for oral defense (mock-viva and viva voce).

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ii

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Approval of Dissertation/Thesis for defense result

We hereby certify that we have examined this dissertation/thesis entitled "Inhalational Corticosteroid underutilization and associated factors among Bronchial Asthma patients visiting at Public hospitals in Bahir Dar city, Northwest Ethiopia" by Addisu Bitew. We recommend and approve the dissertation/thesis a degree of "Specialty program for Internal Medicine."

Board of Examiners

External examiner's name	Signature	Date
Internal examiner's name	Signature	Date
Chair person's name	Signature	Date

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ABSTRACT

Background: Bronchial asthma is a chronic heterogeneous disease defined by history of respiratory symptoms that vary over time and in intensity. Inhalational corticosteroids (ICSs) are the preferred treatment for asthma, as they help control symptoms and prevent worsening and little is known about factors contributing toward this undesirable use.

Objective: To assess inhalational corticosteroid underutilization and associated factors among bronchial asthma patients visiting at public hospitals in Bair Dar city, Noth west Ethiopia

Methods: A hospital based cross sectional study was conducted with chart review and exit patient interviewing at chest clinic among asthmatic patients using structured questionnaire. A total of 368 adult participants were selected using systematic random sampling method. Data was entered to EPI Info 7 and then exported to SPSS version 26 for analysis. Descriptive statics like frequency, mean and median was calculated. A variable with p-value < 0.25 during bivariable logistic regression was entered into multivariable logistic regression. P-value < 0.05 and Adjusted Odds Ratio (AOR) with 95 % confidence interval (CI) was used as a cut-off point for a variable to become significant.

Results: The extent of underutilization of ICSs was found to be 62%. Monthly income less than 1500ETB (AOR: 4.13,95% CI: 1.83-9.31) and 1501-3001 birr (AOR: 2.50, 95% CI: 1.22-5.13), comorbidity (AOR: 3.42 ,95% CI: 1.30-8.99), using salbutamol (AOR: 4.03,95% CI: 2.07-7.83), use of other medication (AOR: 4.34,95% CI:2.30-8.10), level of asthma control (AOR: 2.77,95% CI: 1.30-8.99) and frequency of follow up (AOR: 2.39,95% CI: 1.02-5.63) had significant association with ICS underutilization.

Conclusion: Prevalence of underutilization of ICS was high and the contributing factors were monthly income, comorbidity, using salbutamol, use of other medication, level of asthma control and frequency of follow up. Thus, concerned experts need to take actions that assurance to accessibility of ICS at a reasonable price and increase awareness of patients about asthma disease and use of ICS.

Keyword: -Inhaled corticosteroids, asthma, utilization, public hospitals, Bahir Dar.

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LIST OF ABBREVIATIONS AND ACRONYMS

APH----------Addis Alem Primary Hospital

COPD----------Chronic Obstructive Pulmonary Disease

CVD----------Cardio Vascular Disease

ETB----------Ethiopian Birr

DM----------Diabetes Mellitus

FHRH----------Felege Hiwot Referal Hospital

GINA----------Global Initiative for Asthma

GERD----------Gastro-Esophageal Reflux Disease

ICS----------Inhalation Corticosteroids

HTN----------Hypertension

LABA----------Long-Acting Beta Agonist

LMICs----------Low- and Middle-Income Countries

SABA----------Short Acting Beta Agonist

SPSS----------Statistical Package for Social Science

TASH----------Tikur Anbessa Specialized Hospital

TGSH----------Tibebe Ghion Specialized hospital

WHO ----------World Health Organization

1. INTRODUCTION

1.1 Background

Asthma is a heterogeneous disease defined by the history of respiratory symptoms (e.g., wheeze, shortness of breath, chest tightness, and cough) that vary over time and in intensity, together with variable expiratory airflow limitation. Airway inflammations are a major factor in the pathophysiology of asthma and remain as a principal target of treatment. Accordingly, the diagnosis of asthma is based on a patient's symptom patterns and evidence of airflow restriction that varies over time(1, 2)

Asthma affects around 339 million people in all regions of the world. It causes a high global burden of mortality and morbidity, with around 1000 people dying each day from asthma, and is in the top 20 causes of years of life lived with disability (3). It is common in developed countries, but access to necessary medication and care is limited in low and middle-income countries (LMICs)(4). In Africa, it accounts for 2–10% of medical admissions. A study done in South west Ethiopia showed that asthma accounted for 2% of outpatient visiting and 5.4% of medical admissions (5, 6, 7).

Pharmacological therapy is a key part of asthma management. Inhaled corticosteroids (ICSs) are the most effective medications for long-term control of severe asthma across all age groups. Global initiative for asthma (GINA) recommends low-dose ICS–formoterol as the reliever at all steps: as needed only in Steps 1–2 (mild asthma), and with daily maintenance ICS–formoterol in Steps 3–5. Asthma in adults should not be managed only with short acting beta-agonist. Instead, to reduce the risk of severe exacerbations, and to control symptoms, all adults and adolescents with asthma should be treated with ICS-containing therapy(1, 5)

However, studies conducted in various regions of the world has shown that essential medications for asthma are not being used to their full potential, with developing countries being particularly affected. The under use of inhaled corticosteroids is a significant challenge in the management of asthma, even among patients who have been prescribed these medications by their physicians (8).

1.2. STAMMENT OF THE PROBLEM

Asthma is the leading cause of chronic inflammatory airway diseases, characterized as limited air flow. It is also a major cause of disability, health resource utilization and poor quality of life for those who are affected (9). In 2018, the World Health Organization (WHO) reported that more than 339 million people were affected by asthma. In sub-Saharan African countries, and specifically in Ethiopia, the prevalence rate ranged from 10.2% to 13% (10, 11).

Inhaled corticosteroids (ICSs) are a cornerstone medicine for preventive therapy of severe asthma. Despite the presence of existing guidelines, studies done in different part of the world indicate low utilization of these key medications and developing countries suffering most(12). Medication non-adherence is one of a common problem in asthma management and is the primary cause for uncontrolled asthma. This non-compliance leads to inadequate control of symptoms, reduced quality of life, more frequent hospitalizations, increased healthcare expenses, decreased productivity, and even death (13). Even though ICSs are highly effective in treating persistent asthma, most healthcare providers worldwide are unaware of their use for severe asthma treatment. Recent studies showed that too much use of Short Acting Beta Agonist (SABA) is associated with frequent exacerbations. GINA guideline recommends that overuse of SABA should be avoided. It is well understood that cost of ICS medications affects utilization pattern of patients adversely (1, 12)

In Ethiopia, the use of ICS among total asthmatic patients was 3.8% as shown in a study in Jimma University Specialized Hospital and underutilization of ICS (96.2%) is a significant cause of uncontrolled severe asthma and asthmatic attacks as reported in a study at Tikur Anbessa Specialized Hospital (TASH) (68%)(6, 14, 15). Given the importance of this medication, it would be crucial to determine causes of such underuse. Therefore, the aim of this study was to identify the factors associated with underutilization of ICS among persistent asthma patients visiting at public hospitals in Bahir Dar city. The findings will help to improve asthma management and reduce the frequency of severe asthma attacks.

1.3 SIGNIFICANCE OF THE STUDY

Although asthma cannot be cured, proper management can ensure adequate control of the disease, reverse and even prevent disease progress and enable people to have good quality of life. ICSs are corner stone therapy for persistent asthma. In developing countries, there is low usage of key medications, such as inhaled corticosteroids (ICSs), which are important for treating persistent asthma. Underutilization of ICSs is common and little is known about factors contributing toward this undesirable use. The aim of this study is to assess the proportion of ICS use and associated factors in bronchial asthma patients at public hospitals in Bahir Dar city. This study will help identify gaps in asthma management, reduce health care coast, prevent long term complication, improves patient care and quality of life. And also, it will be useful for healthcare providers and as base line data for researchers.

2. LITERATURE REVIEW

2.1 Prevalence of ICS use

In spite of the proven effects of ICS for asthma management, many studies showed that there is underutilization of ICS due to different factors from both patients themselves and care providers(16).

Similarly, European Community Respiratory Health Survey I, II and III analyzed the trend of ICS use over 20-year period and use of ICSs increased from 1.7% to 5.9% in the general population and the regular use of ICSs increased from 19% to 34% among persistent asthmatic subjects. Despite increased ICS use, only 34% of subjects with severe asthma take ICSs on a regular basis; <50% have seen a physician in the last year(17).

A study done in Sweden showed that changes during the last two decades found that asthma medication was used by 11% of the population, 4.4% used ICS with concurrent use of LABA, 3.3% used ICS without LABA, while 3.2% only used SABA. Compared with 1992, the prevalence of asthma medication use had increased with 54%, and use of ICS had increased from 1.5% to 7.7%. Accordingly, European Community Respiratory Health Survey and study done Sweden indicated using ICS has increased and underuse of ICS is more pronounced in Sweden study group(17)((18).

Similarly, a cross-sectional survey in Philadelphia showed that only 38% of patients reported using ICS at least twice a day almost every day (16).Similar study done at Florida found that16% of users of inhaled beta-agonists reported overuse, and 64% of patients reported underuse of ICS(19).

Another study at university of Toledo, Ohio, USA, to determine the demographic factors predicting patient-reported use of ICSs among patients with asthma reported that low utilization of ICSs was found to exist in the patients with asthma, as more than half of the study population (52.8%) did not report the use of ICSs(20).

Accordingly, population based retrospective cohort study done in Canada to determine if inhaled steroids are underused in the elderly asthmatic population, who are at a high risk for hospitalization and mortality, and to identify certain risk factors that predict lower use of inhaled steroids in this

group of patients. Similarly, the study concluded that (40%) patient did not receive inhaled steroid therapy within 90 days of discharge from their initial hospitalization for asthma(21). This study unlike the other studies, it included elderly patients who are ≥65years age.

Unlike all above mentioned literatures, a nationwide population-based study to analyze ICS prescription rate showed doctor related reason for underutilization of ICS. The study concluded that ICS prescription rate was found to be inadequate, given the importance of ICS as an asthma treatment (22)

In our country, literatures regarding to underutilization of ICS and associated factors are limited. A cross-sectional study done in Jimma to assess asthma control on asthmatic patients attending chest clinic of Jimma University Specialized Hospital, reported only (3.8%) subjects were using ICS. Similarly, study done at TASH indicated underutilization of ICS was 68%(15, 23). Also a cross-sectional study design conducted at Adamma Hospital Medical College to identify factors contributing to underutilization of ICS by asthmatic patients and the result showed that 73.5% of participants had underutilization of ICS (6)

2.2 Factors related to underutilization of inhaled corticosteroids

2.2.1 socio-demographic factors

Studies done previously have indicated that socio-demographic characteristics like age, sex, educational status, and monthly income contribute to underutilization of ICS (15, 19, 24)

Regarding age of patients, contradicting findings have been reported. In this study, it was reported that younger population (18-34) had more probability of underutilization of ICS compared to elderly population (19, 25). By contrast, Sin and Tu, on their study of pattern of ICS use among elderly patients (≥65), reported age as an important barriers to ICS therapy in this population(21).

In contrast to this, a study to assess factors that may affect adherence to ICS therapy like age, sex, residence & level of education had no significant difference (26).

Similar study done to determine the demographic factors (age, gender, race, income level, insurance coverage, and disease severity) predicting patient-reported use of ICSs among patients with asthma found that African Americans and patients with no health insurance demonstrated a

disproportionally lower percentage of reported use of ICSs but there was no significant differences for ethnicity, disease severity, state of residence, income level, age group, or gender(20, 27).

Although some studies show no significant association between ICS use and gender, prospective, observational study to assess the knowledge, attitude and to evaluate the medication adherence among the asthmatic patients show that level of adherence was significantly co-related with gender. Low adherence was significantly higher in males as compared to females. Medium level of adherence was significantly higher in females as compared to males(24, 28).

A cross-sectional survey was done in Philadelphia showed that most frequently cited reasons for inconsistent or non-use of ICS were related to a belief that ICS were unnecessary during asymptomatic periods and to a general concern about side-effects(16).

A study conducted to assess whether the therapeutic aspects of published international asthma management guidelines are practically applicable in developing countries, show that many asthmatic patients in developing countries are not receiving adequate treatment because the required drugs are not available in their area or are prohibitively expensive(29, 30).

2.2.2 Drug related factors and comorbidity

A cross-sectional study which was conducted among persistent asthmatic patients attending chest clinic of TASH showed that patients' reported reasons for low utilization includes; unaffordability (44%), using only when symptoms exacerbate (21%), fear of side effects (10%), practitioners' recommendation (10%) and unavailability of ICSs in the local market (7%). Physicians also stated unaffordability, fear of side effects and dependency, lack of local guideline for asthma management and unavailability of ICSs as the contributing factors (23).Patients with comorbidity are more likely to use other medications than ICS which may lead to increased financial burden. Similarly, taking medications other than asthma medications can result in complicated and burdensome medication regimens often leading to forgetfulness (31).

3. CONCEPTUAL FRAMEWORK

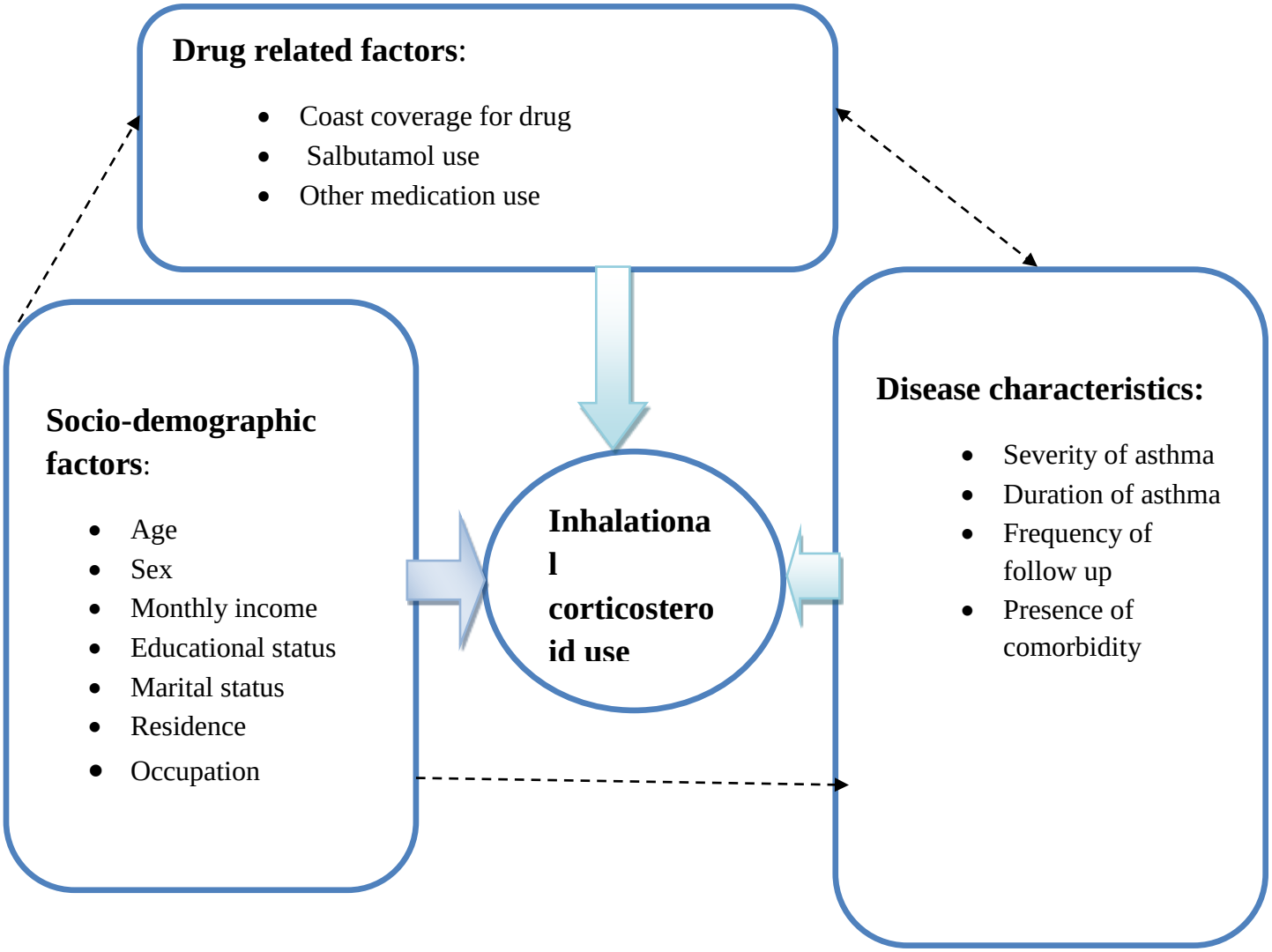


Figure 1: Conceptual frame work of inhalational underutilization and associated factors among bronchial asthma patients visiting at Public Hospitals in Bahir Dar city(6, 14, 15, 27, 28)

4. OBJECTIVE

4.1. General objective

- To assess ICS underutilization and associated factors in Bronchial asthma patients visiting at public hospitals in Bahir Dar city, North west Ethiopia, 2023.

4.2. Specific objectives

- To determine the level of underutilization of ICS among Bronchial asthma patients visiting at public hospitals in Bahir Dar city, North West Ethiopia, 2023.
- To identify factors affecting ICS underutilization among Bronchial asthma patients visiting at public hospitals in Bahir Dar city, North West Ethiopia, 2023.

5. METHOD AND MATERIALS

5.1. Study setting

The study was conducted at public hospitals in Bahir Dar city. Bahir Dar is the capital city of the Amara region in Northern Ethiopia; it is located at the exit of the Abay from Lake Tana at an altitude of 1,820 meters (5,970 ft.) above sea level. The city is located approximately 578 km North-Northwest of Addis Ababa and a total population of 649,429 was estimated in 2012. Three public hospitals have existed in Bahirdar city in giving services for peoples, namely Tibebe Ghion Specialized Hospital (TGSH) and Felege Hiwot Referal Hospital (FHCSH) and Addis Alem Primary Hospital (APH). Tibebe Ghion Specialized Hospital started service in 2011 and is expected to serve around 50,000 populations. And also, Felege Hiwot Referal Hospital started giving service in 1955.These hospitals provides internal medicine, pediatrics, ophthalmology, general surgery, obstetrics and gynecology, ENT, dermatology, dentistry, psychiatry and orthopedic services. The other hospital where study will be conducted is Addis Alem Primary Hospital which is a primary hospital and started to give service since 2007.

Currently, these three hospitals have inpatient beds and outpatient clinics which are expected to serve an estimated 5-7 million people**.** There are subspecialists, internists, residents, general practitioners and interns under internal medicine department. The study was done among bronchial asthma patients who were having follow up at chest and referral clinic in Bahir Dar Public Hospitals from September-December, 2023.

5.2 Study design and period

Hospital based cross-sectional study was conducted from September-December, 2023.

5.3 Source and study population.

5.3.1 Source population

The source populations of this study were all bronchial asthma patients diagnosed clinically, with spirometer or/and both that had follow up at chest clinic in Bahir Dar public hospitals.

5.3.2 Study population

The study populations were all selected patients who had follow up care for bronchial asthma at chest clinic in Bahir Dar public hospitals.

5.4 Inclusion and exclusion criteria

5.4.1 Inclusion criteria

- Patients having asthma who diagnosed by clinically, with spirometer or both at chest clinic
- Age greater than 18 years.
- Complete medical records and patients who are giving consent

5.4.2 Exclusion criteria

- Patients who had less than 03 months follow up at study hospitals and had no complete medical records.

5.5 Sampling and sample size determination

5.5.1 Sample size determination

The sample size was determined using single population proportion formula. Since there was similar study done at Black lion specialized hospital, Addis Ababa which showed the proportion of underutilization of ICS use was 68%. So, using that proportion with 95 % confident interval (CI) and 5% marginal error, the sample was calculated as below formula (23).

- Confidence interval = 95% - Marginal error = 5%

$$n = \frac{Za/_2{}^2 P(1-p}{d^2}$$

Where n- sample size, p=0.68 Z=1.96 (95% CI) d= 0.05

The calculated sample = 334

Taking 10% for non- response rate which was 34, the final total sample size was = 368

5.5.2 Sampling procedures

Participants were selected using systematic sampling techniques, from those K^{th} was determined. By considering; N (total asthma patients visited chest clinic in previous 4 months in 3 hospitals =

747), n (calculated sample size = 368) and k-interval (K = N/n, = 747/368= 2), the first client was selected by lottery method among asthma patients.

Total sample size was proportionally allocated for three public hospitals based on their asthma patient load by using this formula:

$n_h=N_h*n/N$

[n_h = sample size allocated to each hospital,

N_h = number of Asthma patients visiting chest clinic in each hospital in previous 3 months (FHRH= 401, TGSH= 206 and, APH = 140)

n = total sample size (368]

N =total asthma patients visiting chest clinic in previous 4months in 3 hospitals =747

$n_{h=}$ sample size allocated to each hospital (FHRH=198, TGSH= 101, and APH = 69)

Therefore, 368 study participants were taken from at FHRH (198 participants), TGSH (101 participants) and APH (69 respondents).

5.6. Study variables

5.6.1 Dependent variable

- Inhalational corticosteroids use in asthmatic patients

5.6.2 Independent variables

- **Socio-demographic variables**
  - Age
  - Sex
  - Marital status
  - Educational status
  - Resident
  - Monthly income
  - Occupation

- **Disease related characteristics**

  - Severity of asthma
  - Duration of asthma
  - Frequency of follow up
  - Presence of comorbidity

- **Drug related factors**

  - Coast coverage for drug
  - Salbutamol use
  - Other than asthma medication use
  - Affordability and availability of drug
  - Patient related factors (fear of side effects and don't know the advantage of ICS)

5.7. Data Collection Procedures

Pre-developed data collection format was used to collect data from the medical record and patient interviewing. Structured interviewer administered questionnaire and data extraction checklists were prepared through reviewing varieties of literatures. The questionnaire was prepared in English, and translated into Amharic and was back to English to check its consistency. The questionnaire had three parts: socio-demographic characteristics, drug and disease related characteristics, and prevalence of ICS. Exit interview was conducted on study participants who had follow-up for bronchial asthma at chest clinic visiting at public hospitals in Bahir Dar, using the questionnaire. And also, medical chart review conducted to assess medical history of the selected patents.

5.8 Definition of terms & operational definition

Inhaled-Corticosteroids: Asthma medication products containing either corticosteroid alone or in combination with LABAs.

Underutilization of inhaled corticosteroids: The use of suboptimal regimen compared against the recommendation by GINA guideline for the specific step of asthma management or primary

non-adherence or discontinuation in all or not having prescription for ICSs in case of persistent asthma patients (1).

Primary non-adherence: ICS is prescribed by physician but the patient didn't take the medication at all.

Optimal utilization: as recommended by GINA

5.9. Data Quality Assurance

The data collected by trained health professionals (5 nurses who have worked at follow up and outpatient clinics). Training was given for data collators on procedure of data collection. Pre-testing of the questionnaire was conducted on 5% of the sample size (19 asthmatic patients) in Injibara General Hospital. Based on the pre-test; the questionnaire was revised and edited with necessary modification. Besides, over all data collection process was supervised by two internal medicine residents.

5.10 Data Processing and Analysis

The principal investigator checked the collected data and any incomplete documents were cleaned. Data entry was done by Epi info software version 7.1 and analyzed by using SPSS software version 26. The descriptive analysis was done by simple frequencies, means and percentages, and the results were presented by tables, bar graphs, pie charts and text narrations. Binary logistic regression was used to assess an association between the dependent and all the independent variables. All explanatory variables with p-value of < 0.25 from bivariable logistic regression model were fitted in to the multivariable logistic regression model to control the possible effect of confounders. Adjusted Odds Ratio (AOR) and p-value < 0.05 with 95% CI were used to determine variables significantly associated the outcome variable. Multi-collinearity among independent variables was checked using variance inflation factor (VIF) and value above 10 was considered as determining the presence of multicollinearity. Model fitness was checked by Hosmer Lemeshaw Test ($P>0.05$).

5.11. Ethical Considerations

Ethical clearance was obtained from Bahir Dar University Ethics Review Committee. A support letter was sent to three public hospitals in Bahir Dar city. Consent was taken from each study participant and they were informed about full right to withdraw from the study at any time if they

face any difficulties and inconvenience. Names were not included in data collection process. Confidentiality was maintained by keeping the data collection tools locked in a secure cabinet and the electronic data file was kept securely in a password protected computer. Data obtained in the course of study was only handled by the research team.

6. RESULTS

6.1. Socio‐demographic characteristics of participants

A total of 368 study subjects were included in the final analysis and the response rate of the study was 100%. Most of the study participants 235(63.9%) lived in the urban area. Nearly one third of respondents were in age categories of 31-43 years and the mean age of the study subjects was 43.43 (±14.49 SD) years. Above half of study participants were women 192 (52.2%) and more than three fourth 280(76.1%) of the participants were married. With regards to educational status, nearly one fourth 87(23.6%) of the patients had diploma and above, while 143 (38%) of the participants were not able to attend formal education. Furthermore, concerning to monthly income of study subjects about 139 (37.8%) of participants earned less than 1500 Ethiopian Birr (ETB) which is equivalent to $27.2 (Table1).

Table 1: Socio-demographic characteristics of asthmatic patients at public hospital in Bahir Dar city (n=368)

Variable	Description	Frequency	Percentage
Sex	Male	176	47.8%
	Female	192	52.2%
Age	18-30	94	10.5%
	31-43	105	28.5%
	44-46	97	26.4%
	>=57	72	19.6%
Educational status	No formal education	143	38%
	Primary& secondary school	138	37.5%
	College and above	87	23.6%
	Single	47	12.8%
Marital status	Divorced /windowed	41	11.1%
	Married	280	76.1%
Residence	Rural	133	36.1%
	Urban	235	63.9%
Occupation	Farmer	180	48.4%

	Government employee	84	22.8%
	Merchant	72	19.6%
	Others*	32	8.7%
Monthly income	<=1500 ETB	139	37.8%
	1501-3500 ETB	121	32.9%
	>3500ETB	108	29.3%

* Prisoners, students, daily laborers, and retired

6.2. Disease characteristics of the asthmatic patients

Most of the asthmatic patients 317(86.1%) had diagnosis the disease ≤ 21years. About 121(32.9%) of patients had one or more comorbidities (CVD, Allergic rhinitis and GERD (Gastro-Esophageal Reflux Disease)) and most of the participants 145 (43.8%) had follow up within one month & below. According to the classification of GINA 2019, 110(29.9%) of patients had well controlled, 95(25.8%) partly controlled and 163 (44.3%) had uncontrolled asthma (Table 2).

Table 2: Disease characteristics of the asthmatic patients at public hospital in Bahir Dar city (n=368)

Variable	**Categories**	**Frequency**	**Percentage**
Duration of Asthma	<=21	317	86.1%
	>21	51	13.9%
Level of asthma control	Well controlled	110	29.9%
	Partly controlled	95	25.8%
	Poorly controlled	163	44.3%
Frequency of follow up	3 months and above	62	16.8%
	2 months	161	43.8%
	1 month and below	145	43.8%
Comorbidity	CVD (HTN, DM, Stroke)	59	16.1%
	Allergic rhinitis	31	8.4%
	GERD	31	8.4%

	No comorbidity	247	67.1%

6.3. Drug related factors of asthmatic patients

Above half of 202(54.9%) asthmatic patients had community health insurance to cover cost of health care service. Whereas about 152(41.3 %) of the asthmatic patients had taken other than asthma medication for other comorbidity diseases and nearly one third of asthmatic patients 246(66.8%) had taken salbutamol for asthma treatment (Table 3).

Table 3: Drug related characteristics of asthmatic patients at public hospitals in Bahir Dar city (n=368)

Variable	**Categories**	**Frequency**	**Percentage**
Cost coverage for health	Health insurance	202	54.9%
care services	Out of pocket	166	45.1%
Other than asthma	Yes	152	41.3%
Medication use	No	216	58.7%
salbutamol usage	Yes	246	66.8%
	No	122	33.2%

6.4. Prevalence of ICS Use

More than one third 251(68.2%) of asthmatic patients were ordered to take ICS while among 251 prescriptions 218 (86.9%) were ICS alone and 33(13.1 %) were ICS-LABA. From 251 patients with ICS prescriptions, 140(38.0%) reported that they were taking ICS during the data collection period, 97(26.4%) were discontinued ICS while 14 (3.8%) patients were reported that they never began to use ICS despite physician's orders (primary non-adherence). Furthermore, among 368 bronchial asthma patients 228(62%) were on underutilization of ICS (Table 4).

Table 4: Inhaled corticosteroids use among asthmatic patients at public hospitals in Bahir Dar city (n = 368)

Variable	Categories	Frequency	Percentage
ICS prescribed	Yes	251	68.2%
	NO	117	31.8%
Prescribed ICS product type	ICS alone	218	86.9%
(n=251)	ICS – LABA	33	13.1%
Currently ICS used (n=251)	Patient using ICS	140	38.0%
	Discontinued	97	26.4%
	Primary non- adherence	14	3.8%
Underutilization of ICS	Yes	228	62.0%
(n=368)	No	140	38.0%
Pattern of underutilization	Never ICS prescribed	117	51.3%
n=228	Drug discontinued	97	42.5%
	Primary non-adherence	14	6.2%

6.4.1. Patterns of underutilization of ICS

The prevalence of underutilization of ICS among bronchial asthma patients was 62% with 95% of confidence interval from 56.8% to 69.9% (95%CI: 56.8-69.9). Among asthma 228 patients who were underutilized of ICS 117(51.3) patients had never ICS prescription, 97(42.7%) patients were discontinued ICS and 14(6.2%) patients were primary non-adherence (Figure 2).

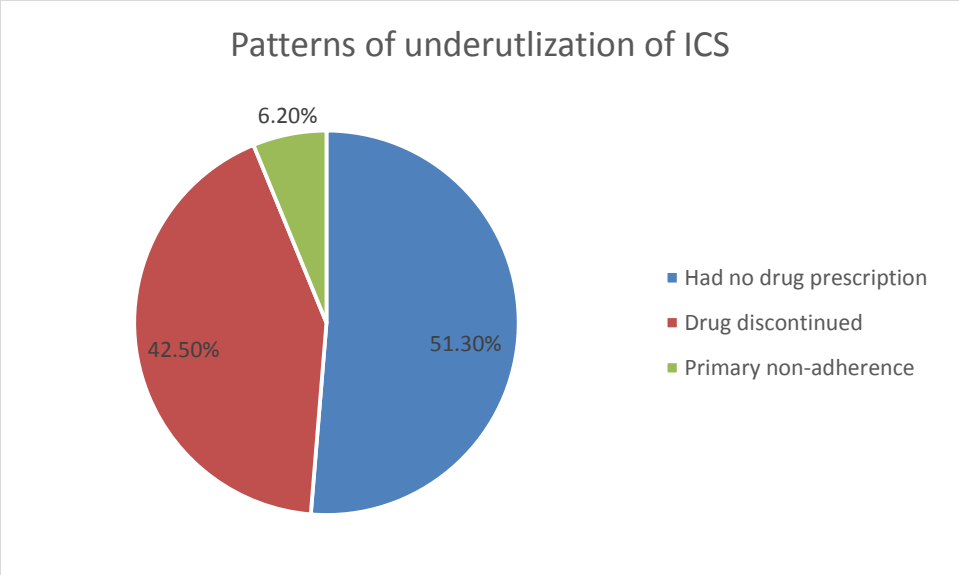


Figure 2: Patterns of underutilization of ICS among Asthmatic patients at public hospitals in Bahir Dar city

6.4.2 Patient's Reports for Underutilization of ICS

Above half of study respondents (56.4%) reported that their reasons for never used ICS were never informed by physician, 19.7% were said that drug was not affordable, 13.7% drug was not available, 15.64% fear of side effects while 9% of the patients were presented with other reasons (Figure 3).

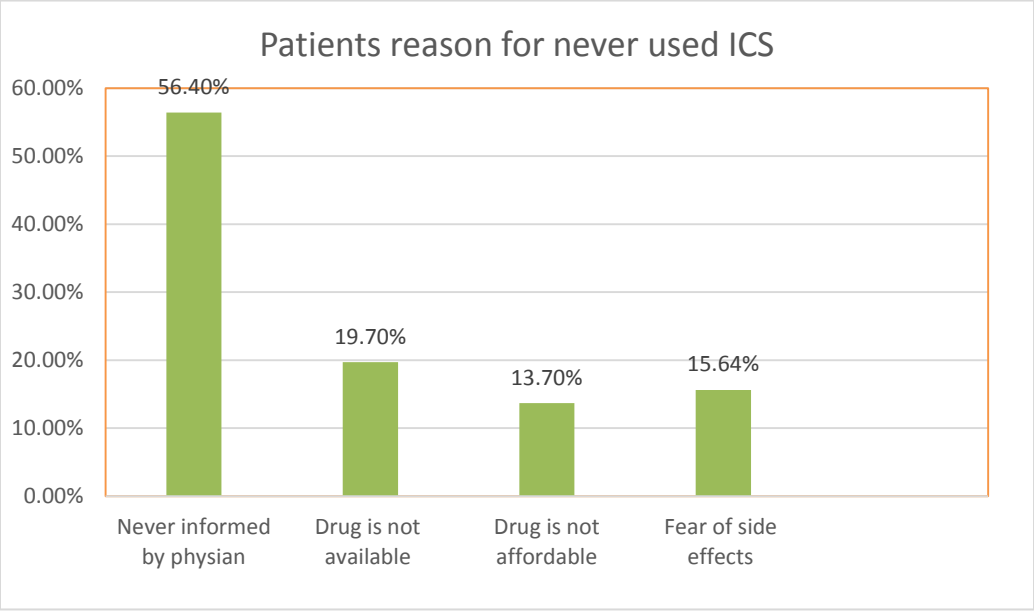


Figure 3: patient's reports (reasons) why never used ICS before among Asthmatic patients at public hospitals in Bahir Dar city.

Patients who were discontinued medication and reported reasons for discontinued, drug is not available for 47.42 %, drug is not affordable account for 23.71%, use only symptomatic for 27.83, preferred other PO forms were each accounting for about 16.49 % and 10.30% of participants said that fear of side effects.

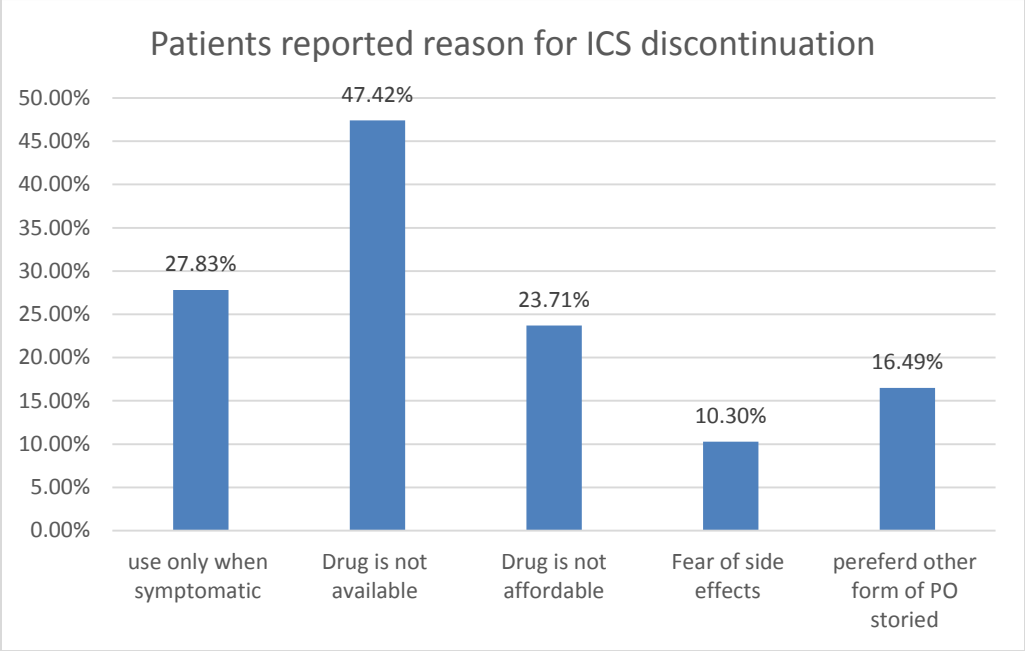


Figure 4: Patients' reports (reasons) for ICS discontinuation among Asthmatic patients at public hospitals in Bahir Dar city

6.5. Factors associated with underutilization of inhaled corticosteroids

Table 5 shows a result of multivariable logistic regression analysis of factors associated with underutilization of ICS among study participants. Patients who had comorbidities; CVD, Allergic rhinitis and GERD had 3.42 times (AOR=3.42, 95%CI: 1.30-8.99), 4.55 times (AOR=4.55, 95%CI: 1.35-15.28) and 3.13 times AOD=3.13, 95%CI: 1.04-9.43) more likely to have the odds of underutilization of ICS as compared to patients with no comorbidity respectively.

The odds of underutilization of ICS among patients who had taken salbutamol medication was 4.03 times (AOR=4.55, 95%CI: 1.35-15.28) more than those who did not take salbutamol.

Those patients with other medication were about 4.34 times (AOR=4.34, 95%CI: 2.30-8.18) more likely to have the odds of underutilization of ICS than who do not use other medication. Those patients who had monthly income of less than or equal to 1500 ETB and 1501-3500 ETB were about 4.13 times (AOR=4.13, 95%CI: 1.83-9.31) and 2.5 times (AOR=2.50, 95%CI: 1.22-5.13) more likely to underutilize ICS than those who had more than 3500 ETB respectively. Those participants who had partly controlled asthma and poorly controlled asthma were about 2.77 times (AOR=2.77, 95%CI: 1.30-5.88) and 2.08 times (AOR=2.08, 95%CI: 1.10-3.93) more likely to underutilize ICS as compared to those who had well controlled asthma respectively. The odds of underutilization of ICS among patients who had frequency of follow up within 3 months and above was 2.35 times (AOR=2.39, 95%CI:1.02-5.63) more than as compared to those who had follow-up frequency lees than one month.

Table 5: Bi-variable and multivariate logistic regression analysis of factors associated with underutilization of ICS among asthmatic patients at public hospitals in Bahir Dar city

Variables	**Category**	**ICS** underutilization		**COR (95%CI)**	**AOR (95%CI)**
		Yes n (%)	**No n (%)**		
Residence	Rural	95(41.7)	38(27.1)	1.92(1.22-3.0)	1.51(0.71-3.23)
	Urban	133(58.3)	102(72.9)	1.00	1.00
Comorbidity	CVD	50(21.9)	9(6.4)	5.25(2.47-11.14)	**3.42(1.30-8.99)** *
	Allergic rhinitis	26(11.4)	5(3.6)	4.91(1.83-13.21)	**4.55(1.35-15.28)** *
	GERD	25(11.0)	6(4.3)	3.94(1.56-9.93)	**3.13(1.04-9.43)** *
	No comorbidity	127(55.7)	120(85.7)	1.00	1.00
Occupation	Farmer	128(56.1)	52(37.1)	1.00	1.00
	Gov't employee	32(14.0)	52(37.1)	0.25(0.15-0.43)	0.89(0.21-3.80)
	Merchant	48(21.1)	24(17.1)	0.81(0.45-	1.78(0.78-4.05)

				1.46)	
	Others	20(8.8)	12(8.6)	0.68(0.31-1.48)	0.58(0.22-1.55)
Educational Status	No formal education	110(48.2)	33(23.6)	5.73(3.19-10.28)	1.75(0.42-7.24)
	Elementary school	86(37.7)	52(37.1)	2.84(1.63-4.95)	1.24(0.29-5.35)
	College &above	32(14.0)	55(39.3)	1.00	1.00
Salbutamol Use	Yes	164(71.9)	82(58.6)	1.81(1.16-2.82)	**4.03(2.07-7.83)** *
	No	64(28.1)	58(41.4)	1.00	1.00
Monthly Income	<=1500 ETB	113(49.6)	26(18.6)	8.69(4.84-15.59)	**4.13(1.83-9.31)** *
	1501-3500 ETB	79(34.6)	42(30.0)	3.76(2.18-6.50)	**2.50(1.22-5.13)** *
	>3500 ETB	36(15.8)	72(51.4)	1.00	1.00
Frequency Of Follow up	> = 3months	41(18.6)	21(15.0)	1.23(0.66-2.30)	**2.39(1.02-5.63)** *
	2 months	98(43.0)	63(45.0)	0.97(0.62-1.55)	1.81(0.98-3.37)
	<= 1month	89(39.0)	56(40.0)	1.00	1.00
Level of Asthma Control	Well controlled	49(21.5)	61(43.6)	1.00	1.00
	Partly controlled	71(31.1)	24(17.1)	3.68(2.03-6.69)	**2.77(1.30-5.88)** *
	Poorly controlled	108(47.4)	55(39.3)	2.45(1.49-4.02)	**2.08(1.10-3.93)** *
Other than Asthma	Yes	123(53.9)	29(20.7)	4.48(2.76-7.28)	**4.34(2.30-8.18)** *

medication use	No	105(46.1)	111(79.3)	1.00	1.00
Cost coverage for drug	Health insurance	143(62.7)	59(42.1)	1.00	1.00
	Out pocket	85(37.3)	81(57.9)	2.31(1.50-3.55)	1.29(0.54-3.10)

Note: * p-value < 0.05, COR- Crude Odds Ratio; AOR- Adjusted Odds Ratio;

7. DISCUSSION

This study aimed to assess underutilization level of ICS and associated factors among in Bronchial asthma patients visiting at public hospitals in Bahir Dar city.

In this study, underutilization of ICS was found to be 62% (95%CI: 56.8-69.9). This finding is in line with a study done in the Addis Abeba Tikur Anbessa where (68%) of the patients were using a low level of ICS (23) and lower than studies done in Adama (73.5%), Netherland (78.1%) USA (74%) and Jimma (96.2%)(6, 14, 27, 28). And also**,** the finding is higher than studies done in Canada (29-39%), India (27.27%), North Africa (26.1%) and USA (52.8%)(15, 25, 28, 30) . The possible justification might be partly due to socioeconomic differences between these countries, study design, time and study setup differences.

With respect to patients' reported reasons for underutilization of ICS, patients who never took ICS before reported that, never informed by physicians was the leading reason for ICS underutilization (56.40%). The reason for this could be absence of local protocol for management of asthma. This underlines the importance of preparing hospital or national guideline for management of asthma.

Drug unaffordability and unavailability are major reasons for underutilization of ICS. Drug inaccessibility for those who were once on ICS but currently discontinued (47.42%) and patients never took (13.7%), were reported as the main reason for ICS underutilization in the study setting due to different conditions which was considered as one of the difficulties linked to ICS underutilization. In addition, unaffordability for those ICS discontinued (23.71%) and never used patients (19.7%), stated as a main difficulty for proper use of ICS due to increasing cost of drug. This finding is in line with reports from elsewhere (29, 32, 33). This finding implies that presence of huge problem which needs attention and solution from government and other concerned bodies.

In the present study, for those who discontinued ICS, the second most frequently mentioned reason was use of ICS when only symptoms arise (27.83%). This finding is supported by other studies(9, 34). The possible explanation for this could be lack of understanding about the nature of the disease, and exact role of ICS in asthma therapy as well as the necessity for their continuous use.

Preferring other PO medication rather than using ICS was another reported reason for underutilization of ICS which accounts (16.49%) for those who discontinued ICS. These are medications which can be taken orally include prednisolone, Theophylline and Almetamine with serious systemic side effects, but they were considered as preferred forms by the patient.

Furthermore, fear of side effects also considered as a reason for underutilization of ICS in both patients who never took (15.64%) and discontinued (10.3%). This result is in harmony with reports from elsewhere(9, 28). However, given that the drug has minimal systemic side effects(29, 34).The possible reason might be due to lack of health education about the drug, patients considered that ICS have side effects and leads to never use of ICS and decrease the dose or discontinue it all .

Patients with one or more comorbid diseases have experienced increased chance of underutilization of ICS due to different reasons. Some comorbidities contributes to respiratory symptoms and poor asthma control (1). In addition, patents who took other than asthma medication have increased chance of experience underutilization of ICS than patients who took only asthmatic drug. Use of medications other than ICS could be a common for patients with comorbid diseases which lead them to increased financial burden and underutilization of ICS. Also, patients taking many drugs may consider medication side effect more worrisome than the consequence of the disease. Finally, physicians might use low doses of ICS due to fear of combined side effects for patients treated for other comorbidities. A similar result is reported elsewhere (6, 21, 35).

Economic status also affects the utilization of health care service and overall health status of the community. In this study, monthly income was significantly associated with ICS underutilization which was consistent with previous studies done in Adama and Canada (6, 35).Patients who have lower monthly income more likely to underutilize ICS as compared to their counterpart. The possible justification might be due to that the increased cost of ICS and other health care services from day to day. So that patients with low monthly income could have challenge to afford ICS drug as well as other medical services for treatment of asthma as a result they did not use ICS.

As bronchial asthma is a chronic disease it needs regular and frequent follow up to have good drug adherence and best out-come for treatment. Those patients having frequency of follow-up

within three months and above had increased the chance of experience underutilizing ICS than patients have frequent follow up. This is line with results of the other studies(36, 37). Infrequent follow up implies absence of regular health care contact and lack of health education regarding to drug adherence, importance of ICS and consequence of not using ICS which increases patients' awareness on utilization of ICS.

Severity of asthma affects the utilization level of ICS in management process. According to GINA, level of bronchial asthma is classified as well controlled, partly controlled and poorly controlled. Patients with partly controlled and poorly controlled asthma have increased risk of underutilization of ICS as compared to patient with well controlled asthma. This is agreement with other studies (25, 38, 39). One possible explanation for this is that patients with partly controlled and poorly controlled asthma may have poor adherence to their medication and infrequent follow-up appointments, which leads to underutilization of ICS.

GINA has no longer recommendation on SABA-only treatment for asthma. All severity of asthma including, mild intermittent asthma should be treated with combination of LABA and ICS. Even though, treating asthma with SABA had impact on utilization ICS and management process of asthma. Patients taking salbutamol have increased risk to under use ICS than patients who did not take salbutamol. Starting treatment with SABA medication like salbutamol alone can make patients to consider it as main asthma treatment, leading to worsening symptoms and a higher risk of not adhering to daily ICS medication(40).

8. LIMITATIONS OF THE STUDY

Since the study design of this study was a cross-sectional design, it is not possible to find temporal relationship between cause and effect. And also, the study didn't address physician related factors that lead to underutilization ICS and patient's knowledge and attitude on asthma. In spite of these limitations, the study was multi-centered which was included three public hospitals.

9. CONCLUSION AND RECOMMENDATION

9.1. Conclusion

In this study, underutilization of ICS was found to be 62%. Never informed by physicians, use of ICS only when symptoms arise, unaffordability and inaccessibility of ICS, fear of side effects of ICS are shown to be major contributing reasons for the reported underutilization of ICS. Monthly income, level of asthma -control, using salbutamol, frequency of follow-up, presence of comorbid diseases and use of other than asthma medication were factors significantly associated with underutilization of ICS.

9.2. Recommendations

- Pharmaceutical Fund and Supply Agency (PFSA), Amhara region health offices and Bahir Dar public hospitals should strongly work towards ensuring consistent accessibility and affordability of ICS.
- Physicians should emphasize on patient education to maximize proper utilization of ICS.
- Physicians should avoid polypharmacy as much as possible.
- Physicians should give attention for patients with poor controlled asthma and other comorbid disease.
- Physicians should give emphasis for time duration in follow up and management process of asthma.

10. REFERENCES

1. Reddel HK, Bacharier LB, Bateman ED, Brightling CE, Brusselle GG, Buhl R, et al. Global Initiative for Asthma Strategy 2021: executive summary and rationale for key changes. American journal of respiratory and critical care medicine. 2022;205(1):17-35.
2. Enilari O, Sinha S. The global impact of asthma in adult populations. Annals of global health. 2019;85(1).
3. Baena-Cagnani CEJCa, reports a. The global burden of asthma and allergic diseases: the challenge for the new century. 2001;1(4):297-8.
4. D'Amato G, Vitale C, Molino A, Stanziola A, Sanduzzi A, Vatrella A, et al. Asthma-related deaths. Multidisciplinary respiratory medicine. 2016;11:37.
5. Network GA. The Global Asthma Report 2018. Auckland, New Zealand: Global Asthma Network, 2018. 2020.
6. Tadesse S, Beyene ZJJoA, Allergy. Contributing Factors for Underutilization of Inhaled Corticosteroids Among Asthmatic Patients Attending at Adama Hospital Medical College, Adama, Ethiopia. 2020:333-41.
7. Mekonnen D, Andualem MJEjohs. Clinical effects of yoga on asthmatic patients: A preliminary clinical trial, Jimma, Southwest Ethiopia. 2010;20(2).
8. Laforest L, Van Ganse É, Devouassoux G, Chatté G, Tamberou C, Belhassen M, et al. [Deliberate interruptions and changes of dose of inhaled corticosteroids by asthma patients: "a community pharmacy study"]. Revue des maladies respiratoires. 2015;32(1):8-17.
9. Al-Jahdali HH, Al-Zahrani AI, Al-Otaibi ST, Hassan IS, Al-Moamary MS, Al-Duhaim AS, et al. Perception of the role of inhaled corticosteroids and factors affecting compliance among asthmatic adult patients. 2007;28(4):569.
10. Redd SC. Asthma in the United States: burden and current theories. Environmental health perspectives. 2002;110(suppl 4):557-60.
11. To T, Stanojevic S, Moores G, Gershon AS, Bateman ED, Cruz AA, et al. Global asthma prevalence in adults: findings from the cross-sectional world health survey. BMC public health. 2012;12(1):1-8.
12. Apter AJ, Boston RC, George M, Norfleet AL, Tenhave T, Coyne JC, et al. Modifiable barriers to adherence to inhaled steroids among adults with asthma: it's not just black and white. Journal of Allergy and Clinical Immunology. 2003;111(6):1219-26.
13. Barnes PJJP. Inhaled corticosteroids. 2010;3(3):514-40.
14. Aberhe W, Hailay A, Zereabruk K, Mebrahtom G, Haile T. Non-adherence to inhaled medications among adult asthmatic patients in Ethiopia: a systematic review and meta-analysis. Asthma research and practice. 2020;6(1):1-8.
15. Zemedkun K, Woldemichael K, Tefera G. Assessing control of asthma in Jush, Jimma, south west Ethiopia. Ethiopian journal of health sciences. 2014;24(1):49-58.
16. Chambers C, Markson L, Diamond J, Lasch L, Berger M. Health beliefs and compliance with inhaled corticosteroids by asthmatic patients in primary care practices. Respiratory medicine. 1999;93(2):88-94.
17. Janson C, Accordini S, Cazzoletti L, Cerveri I, Chanoine S, Corsico A, et al. Pharmacological treatment of asthma in a cohort of adults during a 20-year period: results from the European Community Respiratory Health Survey I, II and III. ERJ open research. 2019;5(1).
18. Ekerljung L, Bjerg A, Bossios A, Axelsson M, Torén K, Wennergren G, et al. Five-fold increase in use of inhaled corticosteroids over 18 years in the general adult population in West Sweden. Respiratory Medicine. 2014;108(5):685-93.

19. Diette GB, Wu AW, Skinner EA, Markson L, Clark RD, McDonald RC, et al. Treatment patterns among adult patients with asthma: factors associated with overuse of inhaled β-agonists and underuse of inhaled corticosteroids. Archives of internal medicine. 1999;159(22):2697-704.
20. Vaidya V, Holiday-Goodman M, Pinto S. Demographic disparities in patient-reported use of inhaled corticosteroids among patients with persistent asthma. Journal of asthma and allergy. 2010;3:101.
21. Tu JV, Sin DD. Underuse of inhaled steroid therapy in elderly patients with asthma. Chest. 2001;119(3):720-5.
22. Choi JY, Yoon HK, Lee JH, Yoo KH, Kim BY, Bae HW, et al. Nationwide use of inhaled corticosteroids by South Korean asthma patients: an examination of the Health Insurance Review and Service database. Journal of Thoracic Disease. 2018;10(9):5405.
23. Ayele Y, Engidawork E, Bayisa T. Assessment of inhaled corticosteroids use and associated factors among asthmatic patients attending Tikur Anbessa Specialized Hospital, Ethiopia. BMC research notes. 2017;10(1):1-7.
24. Apter AJ, Reisine ST, Affleck G, Barrows E, ZuWallack RL. Adherence with twice-daily dosing of inhaled steroids: socioeconomic and health-belief differences. American journal of respiratory and critical care medicine. 1998;157(6):1810-7.
25. Benkheder A, Bouacha H, Nafti S, Taright S, El Ftouh M, Yassine N, et al. Control of asthma in the Maghreb: results of the AIRMAG study. Respiratory medicine. 2009;103:S12-S20.
26. Rifaat N, Abdel-Hady E, Hasan AA. The golden factor in adherence to inhaled corticosteroid in asthma patients. Egyptian journal of chest diseases and tuberculosis. 2013;62(3):371-6.
27. Eger K, Amelink M, Hashimoto S, Hekking P-P, Longo C, Bel EH. Overuse of oral corticosteroids, underuse of inhaled corticosteroids, and implications for biologic therapy in asthma. Respiration. 2022;101(2):116-21.
28. Liou A, Grubb JR, Schechtman KB, Hamilos DL. Causative and contributive factors to asthma severity and patterns of medication use in patients seeking specialized asthma care. Chest. 2003;124(5):1781-8.
29. Watson JP, Lewis RA. Is asthma treatment affordable in developing countries? Thorax. 1997;52(7):605.
30. Arumugam V, Preeti K, Vijay J. Drug utilization assessment in asthma therapy through prescription monitoring at Dehradun hospitals. Indian J Allergy Asthma Immunol. 2008;22(1):15-8.
31. Kelly HW. What is new with the beta2-agonists: issues in the management of asthma. The Annals of pharmacotherapy. 2005;39(5):931-8.
32. Vaidya V, Holiday-Goodman M, Pinto S. Demographic disparities in patient-reported use of inhaled corticosteroids among patients with persistent asthma. Journal of asthma and allergy. 2010:101-6.
33. Ait-Khaled N, Enarson DA, Bissell K, Billo N. Access to inhaled corticosteroids is key to improving quality of care for asthma in developing countries. Allergy. 2007;62(3):230-6.
34. Boulet L-P. Perception of the role and potential side effects of inhaled corticosteroids among asthmatic patients. Chest. 1998;113(3):587-92.
35. Jobin M-S, Moisan J, Bolduc Y, Dorval E, Boulet L-P, Grégoire J-P. Factors associated with the appropriate use of asthma drugs. Canadian Respiratory Journal. 2011;18:97-104.
36. Kondo R, Maeda S, Kikuchi A, Kiyono H, Sato T. Optimal follow-up period after switching to another inhaled corticosteroid/long-acting β2 agonist in patients with asthma: A retrospective study using Japanese administrative claims data. Plos one. 2022;17(10):e0276001.
37. Park HJ, Byun MK, Kim HJ, Ahn CM, Rhee CK, Kim K, et al. Regular follow-up visits reduce the risk for asthma exacerbation requiring admission in Korean adults with asthma. Allergy, Asthma & Clinical Immunology. 2018;14:1-7.

38. Sawicki GS, Strunk RC, Schuemann B, Annett R, Weiss S, Fuhlbrigge AL, et al. Patterns of inhaled corticosteroid use and asthma control in the Childhood Asthma Management Program Continuation Study. Annals of Allergy, Asthma & Immunology. 2010;104(1):30-5.
39. Belachew EA, Netere AK, Sendekie AK. Adherence to inhaled corticosteroid therapy and its clinical impact on asthma control in adults living with asthma in northwestern Ethiopian hospitals. Patient preference and adherence. 2022:1321-32.
40. Dennis SM, Sharp SJ, Vickers MR, Frost CD, Crompton GK, Barnes PJ, et al. Regular inhaled salbutamol and asthma control: the TRUST randomised trial. The Lancet. 2000;355(9216):1675-9.

ANNEX

Annex I: Request Form for Ethical Clearance

Date: ……

To BDU/CMHS Ethics Committee

Subject: To get ethical clearance for my research

I am Dr. Addisu Bitew, a second-year medical resident in Bahir Dar university college of medicine and health sciences, I would like to apply to your office to have ethical clearance to conduct research on inhalational corticosteroid underutilization and its associated factors among bronchial asthma patients visiting at Public Hospitals in Bahir Dar City as partial fulfillment for the requirement of specialty program in internal medicine. Data will be extracted using a prepared questionnaire and patient interviewing; confidentiality of records will be kept.

With regards

Dr. Addisu Bitew (year II medical resident)

Annex II: Questionnaires

Questionnaire No…….

Information Consent Sheet

My name is Dr.Addisu Bitew (IMR3). I am conducting research on **Inhalational Corticosteroid underutilization and associated factors among Bronchial asthma patients** from July 01, 2023 G.C to October 30, 2023 G.C, at Public Hospitals in Bahir Dar City, Northwest Ethiopia.

The research project is approved by the Research Ethics committee of Bahir Dar University. Your participation is purely based on your willingness and you have the right to choose not to take part in this study. The information obtained will be used by policy makers and managing physicians for better care of individual patient and the strategic control of risk factors.

If you agree to participate in the study, you will be asked to answer some questions about yourself and your level of knowledge and involvement in asthma management with controller medications. The information that you provide will be kept confidential by using only code numbers and locking the data. The questionnaire will take approximately 10 to 15 minutes.

Based on the understanding of the information I gave you, are you willing to participate in this study?

Yes ☐ No ☐

Name of interviewer ---------- Signature----------

Table 6: patient Interview Questionnaire

Part I. Socio demographic Characteristics			
101)	Age	…… years	
102)	Sex.	A. Male B. Female	
103)	Occupation	A. Farmer B. Government employee C. Merchant D. Others*	

104)	Educational status	A. No formal education B. Elementary or Secondary School C. College and above	
105)	Marital status	A. Single B. Married C. Divorced /widowed	
106)	Residency	A. Urban B. Rural	
107)	Do you have health insurance?	A. Yes B. No	
108)	Income (in birr/month)	…….	
Part 2: Diseases characteristics			
201)	How long have you been diagnosed with asthma?	---------years	
202)	Frequency of follow up	A. 1Month and below B. 2Months C3 Months and above .	
203)	Severity of asthma based on the symptom control and SABA needed?	A. well controlled (day time asthma symptoms ≥2x a month, no waking, controlled with therapy). B. Partly controlled (symptoms most days, night waking ≥1/wk. well controlled with therapy) C. Poorly controlled (symptoms most days, night waking ≥1/wks., low lung function, uncontrolled despite therapy)	
204)	Do you have any physician confirmed comorbidity?	A. CVS (HTN / DM/ Stroke B. Allergic Rhinitis/ Rhinosinusitis E. GERD F. No comorbidity	
205)	Do you use medication other than asthma medication on regular basis?	A. Yes B. No	
Part 3: Proportion of SABA use			
301)	Do you use salbutamol alone currently?	A. Yes B. No	
Part 4:proportion of ICS use			
401)	Have ever ordered any forms of ICS?	A. Yes B. Never	

402)	If 'Yes' for Q401 ICS type?	A. ICS alone B.ICS-LABA C. Other forms	
403)	Are you using ICS currently?	A. Yes B. Discontinued C. Primary nonadherent**	
404)	If the answer for Q403 is 'YES', which type and what dose?	A. Beclomethasone (only ICS) B. Symbicort (budesonide and formoterol) --------puff/frequency. C. Seretide (fluticasone and salmeterol) ----------puff/frequency. D. Others (specify)? -------dose.	
405)	If the answer is 'Discontinued' for Q403, why discontinued? (>1 answer possible)	A. Use only when symptomatic B. Fear of Side effects/addiction C. Drug is not available in market D. Drug is not affordable E. Ordered by doctors to discontinue F. Preferred other forms of steroid like PO.	
406)	If the answer is 'Never used before' for Q401, why? (>1 answer possible)	A. Never informed by the physician B. Drug is not available C. Drug is not affordable D. Fear of side effects/addiction E. Other (specify)……?	

* Students, prisoners, retired, daily laborers.

THANK YOU!

የ ማጠይቁ ማለያ ቁጥር _____

የ አማርኛ ማስማሚያ ቅፅ

እኔ በባህር ዳር ዩኒቨርስቲ የ ወስጥ ደዌ ህክምና ትምህርት ክፍል የ ስፔሻላይዜሽን ተማሪ ነኝ፡ ፡ ማጠይቁ የ ተዘጋጀዉ በዩኒቨርስቲዉ የ ስፔላዜሽን ፕሮግራም ማሟያ ለሚሆን ጥናት ሲሆን ጥናቱም የ ሚከሄደዉ በጥበበ ግዮን አጠቃላይ ስፔሻላይዝድ ሆስፒታል በሚኙ በቁአሚት አስምን ለማላላከል ከሚወሰድ መዳሃንት (Inhalation corticosteroids) ዝቅተኛ አጠቃቀም ጋር የ ተያያዙ ተግደሮቶች ለማወቅ ሲሆን የ ርስዎ በዚህ ጥናት መሳተፍ የ አስምበሽታን ህክምና ለማሻሻል ጉልህ አስተዋፆ ይኖረዋል፡ ፡

እርሶ በዚሁ ለመሳተፍ ባጋጣሚ የ ተመረጡ ሲሆኑ መጠይቁ በመሉ ፈቃደኝነት ላይ ብቻ የ ተመሰረተ ነዉ፡ ፡ የ ሚይስማማቶትና የ ሚይመቾ ጉዳይ ከገጠመዎ በማ ኛወም ጊዜና ሁኔታ መቋረጥ ይችላሉ፡ ፡

በመጠይቁ ስምዎነ ወም ሆነ አድራሻዎን በጥያቄዉ ወረቀት ላይ መፃፍ አያስፈልግም፡ ፡ እንዲሁም የ ሚሰጡት መልስ በምንም መንገድ ለሌላ ተላልፎ አይሰጥም፡ ፡ መጠይቁን ለመመላት በአማካኝ 10 ደቂቃ የ ሚፈጅ ሲሆን ለምታደርጉልኝ ትብብር በቅድሚያ ከልብ አመሰግናለሁ፡ ፡

በመጠይቁ ዙሪያ ማናቸዉንም ጥያቄዎች አስመልክቶ በዚህ አድራሻ ሊያገኙን ይችላሉ፡ ፡

ስልክ: 0913353959

የ ተጠያቂዉስምምነት: ተስማምቻለሁ ☐

አልተስማማሁም ☐

ክፍል 1፡ ግለ ታሪክና ተያያዘዥጥያቄዎች

ተ.ቁ	ጥያቄ	መልስ
101	እድሜ	----------
102	ፆታ	1-ወንድ 2-ሴት
103	የስራ ሁኔታ	1-የመንግስት ሰራተኛ 2-ነጋዴ 3-አርሶ አደር 4-ሌላ (ይጠቀስ).....
104	የት/ት ደረጃ	1-ያልተማሩ 2-ማንበብ/መፃፍ የሚችል 2-አንደኛ ደረጃ 3-ሁለተኛ ደረጃ 4-ድፕሎማና ከዛ በላይ
105	የትዳር ሁኔታ	1.ያገባ/ች 2.ያላገባ/ች 3.የተፋታ/ች 4.የሞተበት/ባት
106	የሚኖሩበት አካባቢ	1- ገጠር 2- ከተማ
107	የወር ገቢ በኢትዮጵያ ብር	----------

ክፍል ሁለት፡ ህክምና ና ተያያዥጉዳዮች

ተ.ቁ	ጥያቄ	መልስ
201	አስምእንዳለብዎት ከተነገሩ ስንት ጊዜ ሆነ ው(በአመት)	--------
202	የህክምና ቀጠሮ (ክትትል) በየስንት ጊዜውነ ው?(የባለፈው አንድ አመት)	1-ከወር ያነሰ 2-በየ ወር 3-በየ ሁለት ወር 4-በየ ሶስት ወር 5-አራት ወር በላይ
203	የአስምህመምደረጃ በምልክት ና በ SABA አጠቃቀም?	1.ማጠነ ኛ (በወር ≥ 2 ቀን ምልክት፣ ሜታ ምነ ም)

		2.መካከለኛ (በወር ቀን ብዙ ጊዜ፣ ሚታ ≥1በሳምንት፣ በመድሃኒት መቆጣጠር ሚቻል) 3.ከፍተኛ (በወር ቀን ብዙ ጊዜ፣ ሚታ ≥1 በሳምንት፣ ለሞከም አስቸጋሪ)
204	በህክምና የተረጋገጠሌላ በሽታ አለ?	1- ስኳር 2- ግፊት/የልብ ህመም 3- ስትሮክ 4-አለርጅክ ሳይንሳይት 5-GERD 6- ሌላ ካለ ይጠቀስ
205	ከአስም መድሃኒት ሌላ በቁአሚ ት የሚወስዱት መድሃኒት አለ?	1-አዎን 2-የለም
ክፍል ሶስት፣ የ SABA አጠቃቀምሁኔታ፣		
301	አሁን ላይ ታካሚዉ የአስም መድሃኒት (SABA) ብቻ / ያለ ICS / ይወስዳል?	1 -አዎን 2-የለም
302	የጥያቄ ቁጥር 301 ‹አዎን› ከሆነ ባለፍዉአንድ አመት መድሃኒቱን ስንት ጊዜ ና ብልቃት ወስደዋል?	----------
ክፍል አራት፣ የ ICS አጠቃቀምሁኔታ፣		
401	ታካሚዉየአስምመከላከያ መድሃኒት (ICS) ታዝዞለት ያዉቃል?	1-አዎን 2-የለም
402	ለጥያቄ ቁጥር 401 -አዎን ከሆነ፣ መድሃኒቱን ስንት ጊዜ እንደሚጉ ይጠቀስ?	-------
403	የአስም መከላከያ መድሃኒት (ICS) ታዞለት ከሆነ አሁን ይጠቀማል?	1-አዎን 2-ይጠቀምነበር ግን አሁን አይጠቀምም 3-ምንምተጠቅሞአያቅም
404	ለጥያቄ ቁጥር 403 ሜልሱ <አዎን> ከሆነ የአወሳሰድ ሁኔታዉን ይጥቀሱ(regimen)?	1. Beclomethasone (ICS ብቻ) 2. Symbicort (budesonide

		and formoterol) --------- dose. 3. Seretide (fluticasone and salmeterol) ----------dose. 4. ሌላ ካለ ይጠቀስ -------
405	ታካሚዉ ICS or ICS + LABAን <አሁን የሚይጠቀም> ከሆነ ምክንያት?	1-አስመሳኒ ሳብኝ ብቻ ነዉምመስደዉ 2-የጎንዮሽ ጉዳት ስላለዉነዉ 3-መገዛት ስላልቻሉ ነዉ 4.በሃኪም እንዳቋርጥ ተነግሮኝ 5-ለወጥ ስላላዩሀብት ነዉ 6-መድሃኒቱን ስላልወደዱ ነዉ 7-ሌላ ካለ ይጠቀስ-------
406	ታካሚዉICS or ICS + LABAን <ምንም ተጠቅሞ> የሚያቅ ከሆነ ምክንያት?	1-በሀኪም ስለአልታዘዘልኝ 2-መገዛት ስላቻሉ ነዉ 3-መዳሃንቱን ስለሚይገኝ ነዉ 4-የጎንዮሽ ጉዳት ስላለዉነዉ 5-ሌላ ካለ ይጠቀስ-------

አመሰግናለሁ!!