

Assessment of Asthma Treatment Outcomes among Adult Outpatients at Nemmh Chest Clinic in Hadiya Zone, Southern Ethiopia

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ABSTRACT

Background: Asthma is one of the chronic inflammatory disorder of the airways in which many cells and cellular elements play a major role. It is an estimated about 344 million people have the condition as per global asthma network in 2014. The progress of the disease is getting downhill in particular in quickly developing countries, as Ethiopia is one of the east Africa's fast developing country as evidenced by its GDP improvement. The estimated prevalence of asthma in Ethiopia is about 9.1% as per Global asthma network. So, This study aims to assess the asthma treatment outcomes among the adult patients on follow-up at NEMMH, Southern Ethiopia. **Methods:** A retrospective study was designed and conducted based on the asthma patient information card at NEMMH for the past two years (Jan 1st 2014-Jan 1st 2016 G.C). The collected data were analyzed by using SPSS software. **Results:** A total of 174 asthmatic patient's cards was reviewed, and among the patients majority (62.6%) were male and the mean age of the respondents was 35.1 years with standard deviation (SD) of 9.4. The most (53.45%) used asthma drug combination was Salbutamol with Prednisolone for long term asthma control. Among the patients, 40.8% were prescribed for antibiotics for their respiratory and urinary tract infections. The study found that there is a strong effect of social drug abuse with disease

improvement (p-value<0.05). **Conclusion:** This study has demonstrated that despite the availability of effective therapy for asthma, the control of disease is sub-optimal and it falls short of the standard treatment guidelines set by the global network.

Key words: Asthma, retrospective study, exacerbations, outcomes, Ethiopia

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INTRODUCTION

Background of the study

In 2014, the global asthma network reported the prevalence of asthma is intensifying in industrialized developing countries, approximately 334 million people estimated to have this condition which increased from 300 million asthma patients were in 2006. Although most of the countries started the new guideline strategies against the asthma, It is still in aggravation and throws the challenges in reducing the morbidity and mortality rates. The rates remain high, with an estimated as per Disability Adjusted Life Presence of more years lost (DALYS) of 15 million/year and Years of Life lost to disease (YLD) of 2.2%.^[1,2]

Since we know much about the asthma, it is a chronic inflammatory disorder of the airways highly associated with airway hyper responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing, in most cases, the diagnosis of asthma was delayed due to the confusion between the symptoms of asthma with pneumonia.^[3] The progress and severity of the disease can be measured by asthma control test, it is based on 5 symptoms survey that assess the activity, shortness of breath, nocturnal symptom, rescue medication use and self- rating of asthma patient.^[4]

Airborne substances, pollen, dust mites, mold spores, animal wastes, smoking, physical exercise can cause the asthma, one of the atypical asthma is occupational asthma is due to farming, painting, cleaning work, and plastic manufacturing. Over 300 substances causes the asthma conditions, they are highly reactive molecules, some of them are isocyanines, platinum salts, animal biological products that stimulate the production of IgE.^[5]

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 affecting 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.^[6]

Individual patients also respond in various ways to different classes of medications for asthma, including inhaled corticosteroids, leukotriene modifiers, and beta-adrenergic agonists. Because of the inherent variability in responses to therapy, many patients remain symptomatic despite close adherence to national asthma education and prevention program (NAEPP) guidelines.^[7] These guidelines adopted a stepped care approach to intensify the treatment with asthma severity. With the least awareness of the NAEPP guidelines, the asthma is still poorly controlled due to patients and physician's non adherence.^[3]

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.^[8] It identified that there was an inappropriate medication use. More than 40% of the patients didn't receive a prescription of inhaled corticosteroids, which is the mainstay of asthma control, according to NHI (Nursing and Homemakers Inc) guidelines.^[9]

Symptom rates are lower than in industrialized countries, while only South Africa approaches rates found in the UK. Rural African

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Cite this article as: Dalo A, Yarlagadda R, Tatiparthi R. Assessment of Asthma Treatment Outcomes among Adult Outpatients at Nemmh Chest Clinic in Hadiya Zone, Southern Ethiopia. *J Basic Clin Pharm* 2017;8:132-137.

regions always showed much lower asthma prevalence rates than urban areas.^[10,11]

Many asthmatics in Nigeria are treated symptomatically with only oral bronchodilators such as Salbutamol and aminophylline – usually under self supervision.^[12]

Asthma prevalence in eastern Africa, including Eritria, Somalia, Kenya is estimated at 4.4%, most of prescribers not following the asthma management guidelines. If it comes to Ethiopia the prevalence rate was 9.1% as per an article published in PLOS medicine asthma in Africa, and if we come to an area of our study in southern Ethiopia is Hawassa estimated about 4.3% for those living in 270 kilometers away from its capital city, Addis Ababa where it was 11.4% this may due to industrialization.^[13,14]

Most international asthma management guidelines recommend that patients initially diagnosed with asthma receive short acting beta₂ agonist (SABA), preferably by inhalation, combined with inhaled steroids. If poor response is noted, the patient should be prescribed a long acting beta₂ agonist (LABA), combined with inhaled steroids. Other add-on medications may include leukotriene receptor antagonists, theophyllines. During exacerbations, the patients should receive systemic steroids, nebulizer SABA and oxygen until the patient is stable.^[15]

Even though there is much data is available worldwide, there are few literatures on asthma in Ethiopia. Therefore, the aim of this study is to assess asthma treatment outcomes among adult patients, who followed up at a NEMMH chest clinic in Hadiya zone, southern Ethiopia. This study will pave the way to tackle situations of irrational use of asthma drugs conforming to GINA and Ethiopia's standard treatment guidelines. This study is to identify the commonly prescribed anti-asthmatic drugs, find out the treatment outcomes and its association with independent variables.

Operational definitions

Severe asthma exacerbation- defined as a deterioration in asthma resulting in admission to hospital or visits the emergency department or requires systemic steroids for at least 3 days.

Mild asthma exacerbation- the occurrence of one of the following; using of two or more inhalations of as needed reliever in addition to the baseline 24 hour or morning PEF less than the baseline by at least 20% or night awaking due to asthma.

Well controlled asthma - is defined as asthma symptoms twice per week or less, a rescue bronchodilators medication used twice weekly or less, where is no nocturnal or early morning waking, no limitations of work and exercise, the patient and their physicians consider well controlled asthma.

Poorly controlled asthma- is defined as when the patient has at least one reported hospitalization due to asthma or high frequency of symptoms in the last year.

METHODS AND MATERIALS

Study design and population

A retrospective cross sectional study was conducted at NEMM Hospital based on the asthmatic patient's card information available past two years from 1st Jan 2014 to 1st Jan 2016 G.C. This study area can be found in Hosanna town located 232 km southern direction away from the capital city of Ethiopia, Addis Ababa. The study was conducted from 10th Jan to 28th Jan, 2016 G.C. All 174 asthmatic patients treated for asthma were selected on a systematic random sampling for this study and their patient cards were reviewed.

Criteria's for inclusion and exclusion

Inclusion criteria's

All patients greater than or equal to 18 years.

Patients who have been on follow-up for the last two years.

Exclusion criteria's

Those patients who have started treatment less than a month.

Those patients who have incomplete asthmatic patient profile form (medical record).

Variables of the study

Dependent variables

Prescribing pattern: Asthma Medications and Concurrent medication

Treatment outcome: Asthma exacerbation and Asthma related hospitalization

Independent Variables

Age, Sex, Marital status, Patient characteristics, occupation, social drug use

Data collection and processing

Data collection tools

The checklist/data collection format was adapted after reviews of different literatures. Necessary correction was adopted after reviewing of patient profile card that is pertinent to the study.

Data collection and data quality assurance

Data was collected by the data collectors. All selected outpatient cards of asthmatic patient were reviewed and the result was evaluated according to the guidelines of GINA. Pretest was conducted to avoid the errors in the collection. On receipt of every day, data were checked for consistency in response. Ethical clearance letters of permission were presented to NEMM Hospital office and verbal consent was received prior to the study upon agreement of privacy maintenance with the patient information.

RESULTS

Socio-demographic characteristics of asthmatic patients

From a total of 174 subjects, the majority (62.6%) of them were male and the remaining 37.4% were female asthmatic patients, the mean age of the respondents was 35.1 years with a standard deviation (SD) of 9.4, most were between 55-64 years accounted 37.3%. This result indicated that, large numbers were elder patients. In regard to the residence of the respondents 113 (65%) were from rural and 61 (35%) were urban. Out of the total asthmatic patients, majority 126 (72.4%) of the patients were married followed by 38 (21.3%) single, 6 (4%) divorced and 4 (2.3%) of treated patients were widowed. The type of occupation that treated patients engaged was shown that 31.03% patients were employees in governmental and private institutions, 23.56% were engaged in agricultural sector, 15.5% were housewives, 14.4% of treated patients engaged in business sectors like trade/commerce and piety trade and 9.8% were students in different level. The remaining 5.4% of treated patients engaged in other occupations like religious works, laborers.

Of the total patients, as Figure 1 shown that the significant number of patients identified as not users of any form of social drugs like khat, alcohol, cigarette. etc., whereas, 10.2% were using both alcohol and khat users, 7.8% were using khat only, 5.2% were using alcohol only, 4.6% were using all alcohol, tobacco and cigarettes and the remaining 3.4% were using tobacco only in the study period.

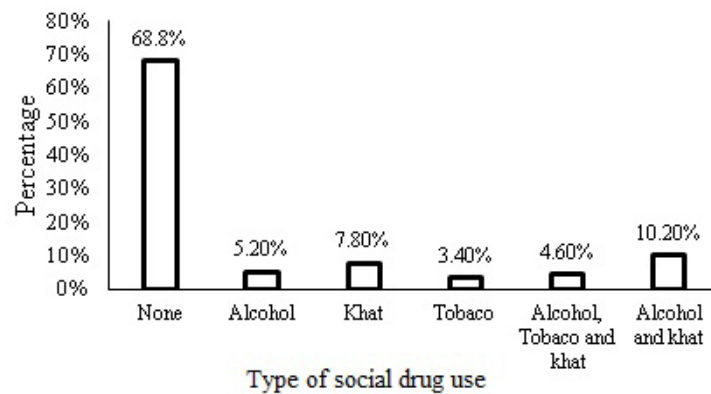


Figure 1: Percentage distribution of treated asthmatic patients by social drug use in NEMMH

Clinical characteristics of asthmatic patients

During the two year period of study, 59% were having an asthma exacerbation among patients, whereas 41% were with no asthma exacerbation among patients. Only 25% of patients were hospitalized minimum in once in their follow up due to asthma related symptoms, the majority (60.2%) patients were hospitalized other than asthma symptom related cases whereas, the remaining 14.71% were due both to the causes.

As shown in Tables 1 and 2 below, shortness of breath is the most asthma symptoms manifested by the studied asthma patients during their visit. Wheezing was high during the first two visits (61.90%, 12, and 38%) respectively and low during the other patient visit. Chest tightness is the lowest asthma symptom manifested starting from the second visit.

Asthma drug prescription pattern among the asthmatic patients

The most commonly prescribed anti-asthmatic drugs among the total asthmatic patients, 93 (53.45%) received were SABA (Salbutamol) with Prednisolone. The second prescribed combination therapy was SABA and beclomethasone puffs 40 (22.98%). No drug was prescribed as monotherapy.

Out of 174 studied asthmatic patients, 46 (26.4%) of them had no concurrent medication prescribed. Of the total concurrent medication prescribed, can be see in Table 3 antibiotics account 40.8%. Next to antibiotics, the most prescribed medications were drugs for dyspepsia, GERD and GI ulcer (antacid, omeprazole and

cimetidine) which accounts 13.2%. According to NEMMH patient card record and follow up chart (2014-2016), some antibiotic used by patients include doxycycline, ceftriaxone, anti-TB, Augmentin, clarithromycin, azithromycin, erythromycin, metronidazole, chloramphenicol, amoxicillin, crystalline penicillin. Whereas, drugs for GERD and dyspepsia includes antacid, omeprazole and cimetidine. Cardiac medications includespironolactone, digoxin, HCT, lovastatin, propranolol, furosemide, enalapril. Anti-pain medication includes ASA, diclofenac, paracetamol and ibuprofen. Dermatological products includecloderm, calamine lotion, dexamethasone cream and Vaseline. Anti-histamine includes loratidine and citrizen. CNS drugs: amitriptyline. Anti- thyroid. Of 174 asthmatic patients, 54 (31.03%) of them uses SABA twice per week. The mean days of SABA use per week was detrmind as 3.09 (± 1.504).

Association between treatment outcome and selected factors

From 174 studied asthmatic patients, 56.2% were having poorly controlled asthma while the rest were controlled asthma 43.8%. There is a strong association between asthma exacerbation and occupational status and social drug use (p -value= <0.05) among the asthmatic patient shown in Table 4.

There is no association between treatment outcome and sex and age of asthmatic patients since, the $p>0.05$ and there is a significance, association between treatment outcome and occupation of patients, and social drug use ($p<0.05$) shown in Table 5.

Table 1: Symptoms that manifested among asthmatic patients in NEMMH

Asthma symptom	1 st visit	2 nd visit	3 rd visit	4 th visit	5 th visit
Symptom free	25(11.9)	63(30)	103(49)	118(56.2)	140(66.5)
Wheezing	130(61.90)	26(12.38)	19(9.04)	23(10.95)	24(11.43)
Cough	151(71.90)	115(54.76)	74(35.24)	72(34.28)	47(22.38)
SOB	172(81.91)	120(57.14)	63(30)	45(21.42)	55(26.19)
Chest tightness	68(32.38)	23(10.95)	22(10.48)	20(9.25)	2(2.85)

Table 2: The combination of anti- asthmatic drugs among asthmatic patient at NEMMH, at Hadiya zone, southern Ethiopia (2014-2016)

Asthma medication	Frequency (%)
SABA and prednisolone	93(53.45)
SABA and beclomethasone puff	40(22.98)
SABA, beclomethasone puff and prednisolone	27(15.51)
SABA (Salbutamol puff and salbutamol tab) only	14(8)
Total	174(100)

Table 3: Concurrent medication prescribed among asthmatic patient at a chest clinic of NEMMH

Concurrent medications	Frequency (%)
No concurrent medication	46(26.4)
Antibiotics	71(40.8)
Drugs for GERD and dyspepsia	23(13.2)
Cardiac medications	12(6.9)
Anti-pain medication	7(4)
Dermatological drugs	7(4)
Anti-histamines	3(1.7)
CNS drugs	3(1.7)
Anti-thyroid drugs	2(1.15)

Table 4: Cross-tabulation of association between asthma exacerbation and socio-demographic characteristics among asthmatic patients at NEMMH

Characteristics	Status	Asthma exacerbation		Total%	p-value
		Yes (%)	No (%)		
Sex	Male	69(39.6)	40(22.9)	109(62.6)	>0.05
	Female	34(19.5)	31(17.8)	65(37.4)	
Age (years)	18-24	7(4)	2(1.15)	9(5.2)	>0.05
	25-34	11(6.3)	2(3.5)	17(9.78)	
	35-44	18(10.3)	13(7.5)	31(17.9)	
	45-54	9(5.2)	1(0.6)	10(5.7)	
	55-64	49(28.2)	16(9.2)	65(37.3)	
	>64 years	26(14.9)	16(9.2)	42(24.2)	
Occupational status	Farmer	35(20.1)	6(3.5)	41(23.56)	<0.05
	Student	5(2.9)	12(6.9)	17(9.8)	
	Housewife	21(12.1)	6(3.5)	27(15.5)	
	Employed	34(19.5)	20(11.5)	54(31.3)	
	Merchant	12(6.9)	13(7.5)	25(14.4)	
Social drug use	None	47(27)	31(17.8)	78(44.8)	<0.05
	Alcohol only	15(8.6)	8(4.6)	23(13.2)	
	Chat only	16(9.2)	8(4.6)	24(13.8)	
	tobacco only	6(3.4)	0	6(3.4)	
	Alcohol, tobacco and chat	7(4)	1(0.58)	8(4.6)	
	Alcohol and chat	25(14.4)	10(5.7)	35(20.2)	

DISCUSSION

Most of the patients diagnosed with asthma were in the 55-64 age groups (37.3) and male to female ratio was 2:1. This is inconsistent with findings done in Uganda in central Africa. In an asthma study in Spain and Latin America, which was found that 37.5% of the patients were in the 45-64 age group and 72% were females.^[16-18] This might be due to geographical and occupational variability between the continents.

In this study, 25% of asthmatic patients' precipitants for asthma exacerbation were lower and upper respiratory infection. This was supported by the study done in the United States which found that 22% of the patients with acute asthma were treated with an antibiotic. This suggests that the most precipitating diseases are infection related. This might be due to only limited patients who demonstrated to have bacterial LRTI received antibiotics as most cases of LRTI are viral.^[19]

Despite the guideline recommends, 8% of the patients were routinely used only SABA either in tablets or inhalation dosage forms for the long-term control of asthma. This is lower than compared with the result of the studies done in Nigeria (57%).^[20]

The most asthma drug combination is SABA+Prednisolone in which 53.45% of patients received for long term asthma control. This is higher than with the study done in Nigeria in which 41% of the patients took oral corticosteroid for long term asthma control.^[17] This might be due to the high cost of inhaled corticosteroids (ICS) and poor adherence of physicians to the guideline.

ICS is 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 38.49% of patients used ICS combination with another drug in this study. This low utilization of inhaled steroids is supported by data from studies in Nigeria which is 28%.^[18] In contrast with GINA guideline, there was no patient using ICS+LABA or LABA only. This low utilization of ICS might be due to poor adherence to standard treatment guidelines.

In this study, it was found that found that 40.8% patients were prescribed for antibiotics for management of upper and lower respiratory and urinary tract infection. This was supported by the studies done in the United States for which 22% of patients with acute asthma were treated with an antibiotic. This might be due to only limited patients who

Table 5: Cross-tabulation of association between asthma treatment outcome and socio-demographic characteristics among asthmatic patient at NEMMH

Characteristics	Status	Treatment outcome			p-value
		Poorly controlled asthma (%)	Well controlled asthma (%)	N=174 N (%)	
Sex	Male	64(36.8)	45(25.9)	109(62.6)	>0.05
	Female	34(19.5)	31(17.8)	65(37.4)	
Age (years)	18-24	6(3.4)	3(1.7)	9(5.2)	>0.05
	25-34	13(7.5)	4(2.2)	17(9.78)	
	35-44	20(11.5)	11(6.4)	31(17.9)	
	45-54	8(4.6)	2(1.1)	10(5.7)	
	55-64	42(24.1)	23(13.2)	65(37.3)	
	>64 years	28(16.1)	14(8.1)	42(24.2)	
Occupational status	Farmer	29(16.7)	12(6.8)	41(23.56)	>0.05
	Student	9(5.17)	8(4.6)	17(9.8)	
	Housewife	19(10.9)	8(4.6)	27(15.5)	
	Employed	37(21.3)	17(9.9)	54(31.3)	
	Merchant	14(8)	11(6.3)	25(14.4)	
	Not using drug	31(17.8)	47(27)	78(44.8)	
	Alcohol only	18(10.3)	5(2.9)	23(13.2)	
Social drug use	Chat only	13(7.5)	11(6.3)	24(13.8)	<0.05
	tobacco only	6(3.4)	0	6(3.4)	
	Alcohol, tobacco and chat	6(3.4)	2(1.15)	8(4.6)	
	Alcohol and chat	27(15.5)	8(4.6)	35(20.2)	

demonstrated to have bacterial LRTI received antibiotics as most cases of LRTI are viral.

The types of medication used for asthma therapy and Co morbid 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 follow at NEMMH 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 surveys 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]

Gender, marital status, age and occupation have no association with treatment outcome, but there is an association between social drug use and treatment outcome (p-value <0.05) which is similar to studies conducted in England.^[21]

Limitation of the study

This study has notable limitations. First, the retrospective nature of the study limited us to examine factors that predict outcome variables in a robust manner. Second, we did not investigate factors that were predictors for poor asthma symptom control.

CONCLUSION AND RECOMMENDATION

Shortness of breath is the most asthma symptoms manifested by the studied asthma patients during their visit. Wheezing was high during the first two visits. Between the combination of anti-asthmatic drugs short acting B-agonist and Prednisolone was the most combinations. Of asthmatic patients, a use of SABA was twice per week.

More than half of the patient's symptoms were poorly controlled. This study has demonstrated that despite the availability of effective therapy for asthma, the control of asthma is sub-optimal among the studied asthmatic patients, and falls in short of the standard treatment guidelines including the Ethiopian recommendations. Based on the key findings of this study, the following key points are recommended for

improvement of asthmatic patients' outcome treatment in the study area:-

- Resources should be channeled the patients on current recommendations of asthma management so as to improve the quality of life of the patients.
- The physician should record asthma symptoms, daily rescue medication use, and the duration of the medication given by the patients each visit appropriately.
- All asthma patients to follow up should be on chronic therapy of inhaled corticosteroid. Long acting B- blocker should be combined with an inhaled corticosteroid for long term control of asthma symptom.

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