Original Research

To study the risk factors and treatment types for asthma severity

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ABSTRACT:

Aim: To study the risk factors and treatment types for asthma severity. **Methods:** This retrospective study was done the Department of chest and T.B. All asthmatic patients whose ages were greater than or equal to 20 years in chronic illness, medication and follow-up clinic for asthma treatment. **Results:** of 100 patients, 20 (20%) severe, 30 (30%) moderate, and 50(50%) were mild asthmatic patients, respectively. patients who were severely asthmatics 40% were female and 60% male. Those who were moderate asthmatic 30% were females and 70% were male. Percentage distributions of those who are mild asthmatic (60%, 40%) were female and male, respectively. The percentage distribution of asthma severity levels by different environmental factors. Out of total adult patients who were severely asthmatic 65%, 35% were registered in the dry season and rainy season, respectively. Of the total study unit who had asthma in childhood stage, 45%, 40%, 60% were severe, moderate, and mild asthmatic, respectively. Patients who had asthma in their family 35%, 40%, 58% were severe, moderate, and mild, respectively. The percentage distribution of asthma symptom seen in adult asthmatic patients are coughing (52%), wheezing (50%), dyspnea (44%), chest pain (25%), limited daily activity (10%), and rhinitis (6%). From 100 patients, who received oxygen (O_2) and prednisolone were 70(70%) 30(30%) respectively. The percentage distributions of beclomethasone, beclomethasone puff were equal which is expressed by 5%. Of all treatments distributed to asthmatic patients in a study unit, Salbutamol puff has a minimum percentage (4%) value. **Conclusions:** The study showed that demographic, environmental, genetic, and health-related factors have a significant effect on asthma severity. the dry season is less likely to asthma severity than the rainy season. Patients who had a habit of regular physical exercise, asthma in childhood, allergen to pet, depressed patients, patients who had asthma in their family history were more likely to develop severe asthma than were not.

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INTRODUCTION

Te prevalence of asthma has strongly increased over the past decades, and approximately 10% of the population in industrialized countries has had asthma at some point.[1] Asthma is a heterogeneous disease, and among the various asthma characteristics involved in the phenotypic heterogeneity of the disease, both clinical observations and statistical cluster-based approaches identifed age at asthma onset as a key diferentiating factor.[2] According to the World Health Organization survey report, the mean prevalence of asthma was 8.2% and 5.2% in poor countries and middle-income countries, respectively. In Africa suggested that greater than 50 million individuals have asthma.[3] The disease is more prevalent in developed countries with the highest rate seen in Australia (21.5%), Sweden (20.2%), United Kingdom (18.2%), Canada (14.1%), and the United States of America (10.9%).[3,4] Although not comparable with high- income countries, many low and middle-income countries are showing an increase in prevalence, increasing the over- all world burden of asthma.[5]

In Africa problems, including those arising from the over-utilization of health services, lack of trained staff and diagnostic apparatus, and non-availability and unaffort- ability of inhaled medications have hindered efforts to improve the management of asthma.[6,7] Some of the African countries are shown to have high asthma preva- lence, for example, South Africa (8.1%), Nigeria (7–18%), and Egypt (9.4%).[8] With respect to asthma prevalence in Ethiopia nationwide data addressing the adult population is lacking. Community-based studies done in Jimma reported a

4.9% prevalence of asthma. Other studies indi- cated 10.7% and 16.2% of the 12-month self-reported prevalence of wheezing in school children in Addis Ababa and Gondar, respectively.[9,10] Assessment of sever- ity is essential to guide initial doses of medications and the frequency of subsequent medical review.[11,12] The severity of asthma varies within and between individuals and is judged according to symptoms and medication requirements. Chronic bronchial asthma is classified as intermit- tent or persistent asthma. The successful management of patients with asthma includes four essential components: routine assessment and monitoring, patient education to create a partnership between clinician and patient, controlling environmental factors and co-morbid conditions that contribute to asthma severity and pharmacological therapy.[12,13]

MATERIAL AND METHODS
This retrospective study was done the Department of chest and T.B., after taking the approval of the protocol review committee and institutional ethics committee. All asthmatic patients whose ages were greater than or equal to 20 years in chronic illness, medication and follow-up clinic for asthma treatment were included in this study.

Asthmatic patients whose ages were less than 20 years, patients lost from follow-up medication or clinic and pregnant ladies (due to the effects of pregnancy on asthma) were excluded from this study. The data were collected by developed structured questionnaires and guidelines from Self-report, direct observation, interview, and chart review of Asthmatic patients during the checkup and follow-up of patients.

RESULTS
From a total of 120 respondents, 100 were included in the final analysis. From total units in the study, 20 (20%) severe, 30 (30%) moderate, and 50(50%) were mild asthmatic patients, respectively.

Patients who were severely asthmatics 40% were female and 60% male. Those who were moderate asthmatic 30% were females and 70% were male. Percentage distributions of those who are mild asthmatic (60%, 40%) were female and male, respectively. For patients who are severely asthmatic, 45% were rural residents, 55% were urban residents. Of the patients who were moderate asthmatic 46.67% were rural, 53.33% are urban residents. Of the patients who are mild asthmatic 62% were rural, and 38% were urban residents. (Table 1.)

Table 1 Distribution of Asthma Severity Level by Demographic Factors

Demographic Factors				
Factors	Category	Severity Levels (%)		
		Severe=20	Moderate=30	Mild=50
Sex	Female	8(40)	9(30)	30(60)
	Male	12(60)	21(70)	20(40)
Residence	Rural	9(45)	14(46.67)	31(62)
	Urban	11(55)	16(53.33)	19(38)
Education	Illiterate Literate	9(45)	18(60)	27(54)
		11(55)	12(40)	23(46)

Table 2 Distribution of Asthma Severity Level by Environmental and Behavioral Factors

Environmental Factors				
Factors	Category	Severity Levels (%)		
		Severe	Moderate	Mild
Season register	Dry	13(65)	14(46.67)	23(46)
	Rainy	7(35)	16(53.33)	27(54)
Smoking habit	Smoker	11(55)	12(40)	24(48)
	Non-Smoker	9(45)	18(60)	26(52)
Exercise (regular)	Yes	7(35)	9(30)	32(64)
	No	13(65)	21(70)	18(36)
Cooking habit	Yes	11(55)	15(50)	19(38)
	No	9(45)	15(50)	31(62)
Allergens to pollen	Yes	11(55)	12(40)	27(54)
	No	9(45)	18(60)	23(46)
Allergens to pet	Yes	6(30)	12(40)	35(70)
	No	14(70)	18(60)	15(30)
Allergens to dust	Yes	8(40)	14(46.67)	29(58)
	No	12(60)	16(53.33)	21(42)

Table 2 also shows that the percentage distribution of asthma severity levels by different environmental factors. Out of total adult patients who were severely asthmatic 65%, 35% were registered in the dry season

and rainy season, respectively. Of those moderate asthmatic patients 46.67%, 53.33% were registered during the dry and rainy season, respectively. And from mild asthmatic patients 46%, 54% were registered in a dry and rainy season, respectively. Of patients who had a habit of regular physical exercise 35%, 30%, 64% are severe, moderate, and mild asthmatic patients, respectively. And from the total study unit who had a regular cooking trend 55%, 50%, 38 were severe, moderate, mild asthmatic, respectively. Of the total study unit who are living with an allergen to pet 30%, 40%, and 70% were severe, moderate, mild asthmatic, respectively.

Similarly, Table 3 shows that the percentage distribution of asthma severity level by the levels of different genetic and health-related factors. From the study unit who had depres- sion, 40%, 46.67%, 54% were severe, moderate, and mild asthmatic, respectively. Of the total study unit who had asthma in childhood stage, 45%, 40%, 60% were severe, moderate, and mild asthmatic, respectively. Patients who had asthma in their family 35%, 40%, 58% were severe, moderate, and mild, respectively.

Table 3 Distribution of Asthma Severity Level by Genetic and Health-Related Factors

Genetic and Health-Related Factors				
Factors	Category	Severity Levels (%)		
		Severe20	Moderate30	Mild50
Depression	Yes	29(40)	14(46.67)	27(54)
	No	101(60)	16(53.33)	23(46)
Asthma in childhood	Yes	32(45)	12(40)	30(60)
	No	98(55)	18(60)	20(40)
Stress	Yes	56(45)	14(46.67)	31(62)
	No	74(55)	16(53.33)	19(38)
Family history	Yes	23(35)	12(40)	29(58)
	No	107(65)	18(60)	21(42)
Co-morbid illness	Yes	60(55)	14(46.67)	26(52)
	No	70(45)	16(53.33)	24(48)
Respiratory infection	Yes	66(55)	15(50)	24(48)
	No	64(45)	15(50)	26(52)
Body mass index of patients	Under weight	10(25)	9(30)	15(30)
	Normal	88(35)	9(30)	10(20)
	Over weight	26(20)	6(20)	20(40)
	Obese	6(20)	6(20)	5(10)

Table 4 shows that the percentage distribution of asthma symptom seen in adult asthmatic patients are coughing (52%), wheezing (50%), dyspnea (44%), chest pain (25%), limited daily activity (10%), and rhinitis (6%).

Table 4: Distribution of Asthma Symptoms

Symptom	Number of Patients	Percentage (%)
Cough	52	52
Wheezing	50	50
Dyspnea	44	44
Chest pain	25	25
Limits daily activity	10	10
Rhinitis	6	6

Table 5 shows that highly distributed treatment to asth- matic patients is oxygen (O_2) and prednisolone. From 100 patients, who received oxygen (O_2) and prednisolone were 70(70%) 30(30%) respectively. The percentage distributions of beclomethasone, beclomethasone puff were equal which is expressed by 5%. Of all treatments dis- tributed to asthmatic patients in a study unit, Salbutamol puff has a minimum percentage (4%) value.

Table 5 Distribution of Treatments for Adult Asthmatic Patients

Treatment Types	Number of Patients	Percentage
Oxygen(O_2)	70	70
Prednisolone	30	30
Abetamol	13	13
Oral Salbutamol	11	11
Oral Salmentrol	10	10

Theophedrine	8	8
Dexamethasone	7	7
Beclomethasone	5	5
Beclomethasone puff	5	5
Salbutamol puff	4	4

Table 6 Distribution of Treatments Corresponding to Severity Level

Treatment Types	Severity Level (%)		
	Severe	**Moderate**	**Mild**
Oxygen(O_2)	20(28.57)	22(31.43)	28(40)
Prednisolone	10(33.33)	5(16.67)	15(50)
Abetamol	3(23.08)	6(46.15)	4(30.77)
Oral Salbutamol	5(45.45)	3(27.27)	3(27.27)
Oral Salmentrol	1(10)	3(30)	6(60)
Theophedrine	3(37.5)	1(12.5)	4(50)
DexyclamethasoneDexamethasone	2(28.57)	2(28.57)	3(42.86)
Beclomethasone	2(40)	1(20)	2(40)
Beclomethasone puff	3(60)	1(20)	1(20)
Salbutamol puff	1(25)	1(25)	2(50)

DISCUSSION

From 100 patients included in the study, presenting asthma symptom seen in adult asthmatic patients treated with chronic illness, medication and follow-up were coughing (52%), wheezing (50%), dyspnea (44%), chest pain (25%), limited daily activity (8%), and rhinitis (6%). It is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role and this chronic inflammatory disorder may cause airway hyper-responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing. This study finding is comparable to the study conducted in Ethiopia in 2015,[15] Uganda in 2012,[6] and Denmark on the major symp- tom and sign seen among those diagnosed with asthma. Similarly, from total units in the study, 130 (30.8%) severe, 132 (31.28%) moderate, and 160 (37.91%) mild asthmatic, respectively. This study finding is relatively comparable with the study conducted in Ethiopia 2015;[15] in this study, the results are shown us high percentage value in each asthma severity level as compared to the study conducted in Malaysian health and morbidity (MHM SUR II) in 1996. This may be due to the less understanding creation of possible causes of asthma severity.

The drug prescribed to patients in chronic follow-up clinics of the University of Gondar Teaching Hospital (UOGTH) is not based on the Global Initiative for Asthma Management and Prevention (GINA) standard. The prescrip- tion asthma treatment was low, for example, over 11.85 of the patients received oral salbutamol therapy instead of inhaled salbutamol. The reason may be the cost because inhaled steroid and beta$_2$ agonist are more expensive than oral sal-butamol. The cost has been recognized as a factor in asthma medication use in many developing countries. The 73% of the patients received oxygen treatment. This finding may be due to less cost of oxygen drug. This result agreed with the study conducted in Uganda

in 2012. The 30% of the patients received Prednisolone. This drug highly recom- mended in GINA, this result is almost agreed with the Global Initiative for Asthma Management and Prevention (GINA) 2014.[7,16] The percentage coverage who received theophedrine drug was 8%. This result is relatively comparable with studies conducted in Ethiopian and India.[7,17] 7% of patients received dexamethasone.

This study has demonstrated that women, rural resident patients, patients who had a habit of regular physical exercise, patients who were asthmatic in childhood stage, patients who live with a pet, patients who had depression, patients who had asthma in their family have a greater risk of having severe asthma than were not. And patients in the dry season and patients who were regular cookers were less likely to develop severe asthma.

The study shows that there is a significant association between sex and asthma severity. Females had more often severe asthma than men. This is due to the fact that in females, there is a relative change in work activity which leads to more opportunities to develop severe asthma. This result is comparable to the study conducted in England,[18] Sweden,[19] Indian,[20] and Columbia.[16] There is a significant difference in the asthma severity between urban and rural residential patients. This study showed that people living in rural areas were highly risked to develop severe asthma than people live in urban areas. The possible reason for the higher frequency of rural resident patients will be less understanding of factors of asthma than urban resident patients. This result is agreeing with the study conducted in India.[20]

This study also showed that the dry season is less likely to increase asthma severity than the rainy season. Since asthma is a thickening of the airway wall problem, this airway wall may relax in the dry season. This result was agreed with the study conducted in China 2015, Uganda.[6] This study

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showed that patients who had regular cooking habits were less likely to develop severe asthma. This result contradicts the study conducted in China,[2] England.[18] This contradicted result may be due to the study methodology difference that they use. Patients who live with the allergen to pets are highly risked to increase asthma severity. A dog or cat quickly becomes a member of the family, and unfortunately, many allergic animal lovers find themselves facing the daily discomfort of per- sistent allergy symptoms and this allergy symptom may lead to increased severity of asthma. This result is comparable to the study conducted in Sweden,[19] Columbia.[16] Patients who had a habit to do regular physical exercise were highly risked for severe asthma in this study. This indicates an asthma type is exercise-induced which is exacerbated by regular physical exercise. This result is contradicting with the Global Initiative for Asthma Management and Prevention (GINA) 2014.[16]

In this study, the result showed that patients who had asthma in their family were highly risked to increase severity levels of asthma, suggesting that genetic factors play a central role in increasing asthma severity. This result agreed with the study in China[2] and India.[20] Patients who were asthmatic in the childhood stage were highly risked for severe asthma in this study. Reactivity to inhalant allergens may increase with age. This result is agreeing with the study conducted in China[2] and the Netherlands. Patients who were depressed were highly risked to develop severe asthma than among those who were not. Since depression is mental tiredness, this case psychological activity plays an active role in the genesis of asthma. This result is comparable with a study conducted in India,[20] and Columbia.[16]

CONCLUSIONS

The study showed that demographic, environmental, genetic, and health-related factors have a significant effect on asthma severity. the dry season is less likely to asthma severity than the rainy season. Patients who had a habit of regular physical exercise, asthma in childhood, allergen to pet, depressed patients, patients who had asthma in their family history were more likely to develop severe asthma than were not.

REFERENCE

1. Sood A, Qualls C, Schuyler M, Arynchyn A, Alvarado JH, Smith LJ, et al. Adult-onset asthma becomes the dominant phenotype among women by age 40 years. The longitudinal CARDIA study. Ann Am Thorac Soc. 2013;10(3):188–97.
2. Kaur R, Chupp G. Phenotypes and endotypes of adult asthma: Moving toward precision medicine. J Allergy Clin Immunol. 2019;144(1):1–12. 3. Wenzel SE. Asthma: defning of the persistent adult phenotypes. Lancet (Lond, Engl). 2006;368(9537):804–13
3. Masoli M, Fabian D, Holt S, Beasley R. Global Initiative for Asthma program. The global burden of asthma: executive summary of the GINA dissemination committee report. Public Health Rev Allergy. 2005;83:548–554.
4. Brasier AR, ed. Heterogeneity in Asthma, Advances in Experimental Medicine and Biology 795. Gavleston: The University of Texas Medical Branch; 2014. doi:10.1007/978-1-4614-8603-9_2.
5. Pearce N, Weiland S, Keil U, et al. Self-reported prevalence of asthma symptoms in children in Australia, England, Germany and New Zealand: an international comparison using the ISAAC protocol. Eur Respir J. 1993;6:1455–1461.
6. Uijen AA, Schermer TRJ, van den Hoogen HJM, Mulder J, Zantinge EM, Bottema BJAM. Prevalence of and health care con- sumption for asthma and COPD in relation to ethnicity. Indian J Dermatol. 2015;60(6):635. doi:10.4103/0019-5154.169144
7. Reddel HK, Taylor DR, Bateman ED, et al. An official American Thoracic Society/European Respiratory Society statement: asthma control and exacerbations: standardizing endpoints for clinical asthma trials and clinical practice. Am J Respir Crit Care Med. 2009;180 (1):59–99. doi:10.1164/rccm.200801-060ST
8. Onyedum CC, Ukwaja KN, Desalu OO, Ezeudo C. Challenges in the Management of bronchial asthma among adults in Nigeria: a systematic review. Ann Med Health Sci Res. 2013;3(3):324–329. doi:10.4103/2141-9248.117927
9. Melaku K, Berhane Y. Prevalence of wheeze and asthma related symptoms among school children in Addis Ababa, Ethiopia. Ethiop Med J. 1999;37(4):247–254.
10. Tefereedgn EY, Ayana AM. Prevalence of asthma and its association with daily habits in Jimma Town, Ethiopia. Open J Asthma. 2018;2 (1):011–017.
11. Masoli M, Fabian D, Holt S, Beasley R. Global Initiative for Asthma program: the global burden of asthma: executive summary of the GINA dissemination committee report. Allergy. 2004;59(5):469–478. doi:10.1111/j.1398-9995.2004.00526.x
12. National Asthma Council Australia. Australian Asthma Handbook – Quick Reference Guide, Version 1.0. Melbourne: National Asthma Council Australia; 2014. Available from: http://www.asthmahand book.org.au
13. Expert panel report 2: guidelines for the diagnosis and management of asthma (EPR–2 1997). NIH Publication No. 97-4051. Bethesda, MD: U.S. Department of Health and Human Services; National Institutes of Health; National Heart, Lung, and Blood Institute; National Asthma Education and Prevention Program, 1997.
14. Harrell FE Jr. Regression Modeling Strategies, with Applications to Linear Models, Logistic Regression, and Survival Analysis. New York: Springer-Verlag; 2001.
15. Helen K, Mark J. Global Initiative for Asthma: global strategy for asthma management and prevention, pocket guide for health professionals. Eur Respir J. 2015;36:28–29.
16. Zahran HS, Bailey CM, Qin X, Moorman JE. assessing asthma severity among children and adults with current asthma. J Asthma. 2014;51(6):610–617. doi:10.3109/02770903.2014.892966
17. Sanya RE, Kirenga BJ, Worodria W, Okot-Nwang M. Risk factors for asthma exacerbation in patients presenting to an emergency unit of a national referral hospital in Kampala, Uganda. Afr Health Sci. 2014;14(3.):707–715. doi:10.4314/ahs.v14i3.29
18. Hosmer D, Lemeshow S, et al. Assessing the fit of the model. In: Cressie NAC, Fisher NI, Johnstone IM,

Kadane J, David W, editors. Applied Logistic Regression, 2nd. New York: John Wiley and Sons, Inc.; 1989:143–200.

19. Kirenga JB, Okot-Nwang M.The proportion of asthma and patterns of asthma medications prescriptions among adult patients in the chest, accident and emergency units of a tertiary health care facility in Uganda. J Afr Health Sci. 2012;12(1):48–53.

20. Pedersen SE, Hurd SS, Lemanske RF Jr, et al. Global strategy for the diagnosis and management of asthma in children 5 years and younger. Pediatr Pulmonol. 2011;46(1):1–17. doi:10.1002/ ppul.21321