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ASSESSMENT OF RATIONAL USE OF ASTHMA MEDICATIONS AMONG ASTHMATIC PATIENTS IN BAHRI AND ALSHAAB TEACHING HOSPITALS

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ABSTRACT

Introduction: Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. It is usually characterized by shortness of breath, chest tightness, wheezing and coughing. **Objective**: The main objective of this study was to assess rational use of asthma medications among asthmatic patients in two teaching hospitals. **Method**: A descriptive cross sectional hospital based study, data was collected during October and November 2014, using close-ended questionnaire included demographic data of patients, question to assess clinical control of asthma, clinical indication regarding inhaled corticosteroid preventer therapy, adherence to treatment, regular review, and PMDI technique assessment. Data was analyzed using statistic package for social sciences (SPSS-V15) and Microsoft Excel 2010. **Results**: The result obtained showed that, asthma symptoms was uncontrolled in 60.35%, ICS is indicated for 76.4, 45.8% were regular users of ICS, 35.5% have regular review, 19.8% have correctly performed full PMDI technique and 41.3% of the studied sample performs the entire essential steps of inhaler technique correctly. **Conclusion**: Asthma is uncontrolled among the studied sample, lack of optimal medication use and regular review and PMDI is widely miss used by asthmatics in this study.

INTRODUCTION

Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. It is usually characterized by shortness of breath, chest tightness,

wheezing and coughing.[1] Asthma also characterized by recurrent attacks of symptoms, which vary in severity and frequency from person to person. Symptoms may occur several times in a day or a week in affected individuals, and for some people become worse during physical activity or at night. During an asthma attack, the lining of the bronchial tubes swell, causing the airways to narrow and reducing the flow of air into and out of the lungs. Recurrent asthma symptoms frequently cause sleeplessness, daytime fatigue, reduced activity levels and school and work absenteeism. Asthma has a relatively low fatality rate compared to other chronic diseases.[2] Asthma is public health problem .It occurs in all countries regardless level of development .it appears that the global prevalence of asthma ranges from 1% to 18% of the population in different countries. Clinical manifestation of asthma can be controlled with appropriate treatment, when control is achieved there should be no more than occasional flare-ups and sever exacerbation should be rare.[1]

Staging of the Severity of an Acute Asthma Attack[26]

1. **Stage I (mild)**

– Mild dyspnea
– Diffuse wheezing
– Adequate air exchange

2. **Stage II (moderate)**

– Respiratory distress at rest
– Marked wheezing

3. **Stage III (severe)**

– Marked respiratory distress
– Cyanosis
– Marked wheezing or absence of breath sounds

4. **Stage IV (respiratory failure)**

– Severe respiratory distress, lethargy, confusion, prominent pulsus paradoxus.

Treatment of asthma: The appropriate drug treatment regimen for asthma is based on the frequency and severity of the asthma attacks and may include the following[26]

1. Avoidance of triggers, and allergens. Improved ventilation of the living spaces, use of air conditioning.

2. *Bronchodilators* (examples: albuterol, terbutaline): Short acting β- *Adrenergic* receptor activators. May be administered as needed in the form of a nebulizer solution using a metered dispenser or may be given subcutaneously. These drugs block bronchoconstriction but *do not* prevent the inflammatory response.
3. *Xanthine drugs* (example: theophylline): Cause bronchodilation but may also inhibit the late phase of asthma. These drugs are often used orally as second-line agents in combination with other asthma therapies such as steroids. Drug like theophylline can have significant central nervous system, cardiovascular and gastrointestinal side effects that limit their overall usefulness.
4. *Anti-inflammatory drugs* (corticosteroids): Used orally or by inhalation to blunt the inflammatory response of asthma. The most significant unwanted effects occur with long-term oral use of corticosteroids and may include immunosuppression, increased susceptibility to infection, osteoporosis and effects on other hormones such as the glucocorticoids.
5. *Cromolyn sodium:* Anti-inflammatory agent that blocks both the early and late phase of asthma. The mechanism of action is unclear but may involve mast cell function or responsiveness to allergens.
6. *Leukotriene modifiers* (example: Zafirlukast): New class of agents that blocks the synthesis of the key inflammatory mediators, leukotrienes.

Key Educational Messages: Teach and Reinforce at every Opportunity[27]

❖ **Basic Facts about Asthma**

- The contrast between airways of a person who has and a person who does not have asthma; the role of inflammation.
- What happens to the airways in an asthma attack?

❖ **Roles of Medications—-Understanding the Difference between the Following**

- Long-term-control medications: prevent symptoms, often by reducing inflammation. Must be taken daily. Do not expect them to give quick relief.
- Quick-relief medications: short-acting β_2-agonists relax muscles around the airway and provide prompt relief of symptoms. Do not expect them to provide long-term asthma control. Using quick-relief medication on a daily basis indicates the need for starting or increasing long-term control medications.

❖ **Patient Skills**

- Taking medications correctly

– Inhaler technique (demonstrate to patient and have the patient return the demonstration).

– Use of devices, such as prescribed valve holding chamber, spacer, nebulizer.

- Identifying and avoiding environmental exposures that worsen the patient's asthma (e.g., allergens, irritants, tobacco smoke).

- Self-monitoring to:

– Assess level of asthma control.

– Monitor symptoms and, if prescribed, peak flow.

– Recognize early signs and symptoms of worsening asthmas.

- Using written asthma action plan to know when and how to:

– Take daily actions to control asthma.

– Adjust medication in response to signs of worsening asthma.

– Seek medical care as appropriate.

❖ **Steps to Correct Use of Metered-Dose Inhalers**[27]

- If using a spacer, see manufacturer's instructions. Same basic principles of slow, deep inhalation with adequate breath hold apply. With spacers, put mouthpiece on top of your tongue to ensure that tongue does not block aerosol.

1. Shake the inhaler well and remove the dust cap.
2. Exhale slowly through pursed lips: As long as exhalation is slow, exhale can take place over several seconds. Some experts insist on exhaling only a tidal volume, but the key is to exhale slowly.
3. If using the “closed-mouth” technique, hold the inhaler upright and place the mouthpiece between your lips. Be careful not to block the opening with your tongue or teeth.
4. If using the “open-mouth” technique, open your mouth wide and hold the inhaler upright 1–2 inches from your mouth, making sure the inhaler is properly aimed.
5. Press down on the inhaler once as you start a slow, deep inhalation.
6. Continue to inhale slowly and deeply through your mouth. Try to inhale for at least 5 seconds.
7. Hold your breath for 10 seconds (use your fingers to count to 10 slowly). If 10 seconds makes you feel uncomfortable, try to hold your breath for at least 4 seconds.

8. Exhale slowly: If patient has concomitant rhinitis, exhaling through the nose may be of benefit when using corticosteroids, cromolyn, or ipratropium (i.e., some medication may deposit in nose).
9. Wait at least 30–60 seconds before inhaling the next puff of medicine.

MATERIALS AND METHOD

The aim of asthma management is control of the disease; in this study, we adopted Gina guidelines for assessment of current clinical control preferably of 4 weeks by assessing daytime symptoms, nocturnal symptoms, and use of reliever and limitation of activity to classify asthma patients in to controlled, partly controlled and uncontrolled asthmatics. This classification has been shown to correlate well with asthma control test and with assessment of asthma control according to us national expert panel report 3 guidelines.[5] As this assessment correlate well with asthma control test, which is being one of the validated measures of assessing clinical control of asthma symptoms, even when spirometric services are not readily available.[16]

Study design: Descriptive cross sectional survey of asthma patients coming to outpatient clinic of Bahri and Alshaab Teaching Hospitals. Study area: Outpatient clinic of Bahri Teaching Hospital compared to outpatient clinic of Alshaab Teaching Hospital as it contains department of lung disease and being a major hospital of Khartoum state representative of patient coming from different area of Khartoum state. It contains three days outpatient clinic for lung disease compared to one-day outpatient clinic in Bahri Teaching Hospital. Study population: Asthmatic patients attending outpatient's clinic of Bahri and Alshaab Teaching Hospitals with age above 18 years. Study duration: The study was conducted in the period between 12 / 10 / 2014 to 20 / 11 / 2014 as 4 weeks in each hospital. Considering that outpatient's clinic is 3 days / week in Alshaab Teaching Hospital compared to 1 day / week in Bahri Teaching Hospital.

Sampling: The sampling method for the patients was non-parametric (convenience) sampling of patients attending outpatient's clinic of Alshaab Teaching Hospital and Bahri Teaching Hospital. Sample size: Total number of patients attending outpatient clinic of Alshaab Teaching Hospital in September/2014 =149. Total number of patients attending outpatient clinic of Bahri Teaching Hospital in September2014 =69.by using the equation:

n=N/ (1+N (e) 2) where n=sample size, N=study population and e=is degree of accuracy that usually =0.05.

According to these numbers the study sample size is estimated to be (109) patients from Alshaab Teaching Hospital and (59) patients from Bahri Teaching Hospital. By using convenience method, the actual sample studied is 89 patients from Alshaab and 52 patients from Bahri Teaching Hospitals.

Data collection: researcher herself collected Data by direct questioning of patients using Gina guidelines for assessing clinical control,[15] questions about the preventer used and scoring of metered dose inhaler technique adopted from previous study.[25] Data was recorded immediately and then analyzed by SPSS (v-15.0) program and manually. Tools of study: Questionnaire and PMDI device covered with disposable plastic bag.

RESULTS

Table No 1.a: Distribution of age among asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Age distribution		Hospital		Total
		Alshaab	Bahri	
16-25	Count	10	4	14
	% within Hospital	11.2%	7.7%	9.9%
26-35	Count	14	9	23
	% within Hospital	15.7%	17.3%	16.3%
36-45	Count	21	14	35
	% within Hospital	23.6%	26.9%	24.8%
46-55	Count	23	14	37
	% within Hospital	25.8%	26.9%	26.2%
56-65	Count	15	9	24
	% within Hospital	16.9%	17.3%	17.0%
66-75	Count	4	2	6
	% within Hospital	4.5%	3.8%	4.3%
More than 75	Count	2	0	2
	% within Hospital	2.2%	.0%	1.4%
Total	Count	89	52	141
	% within Hospital	100.0%	100.0%	100.0%

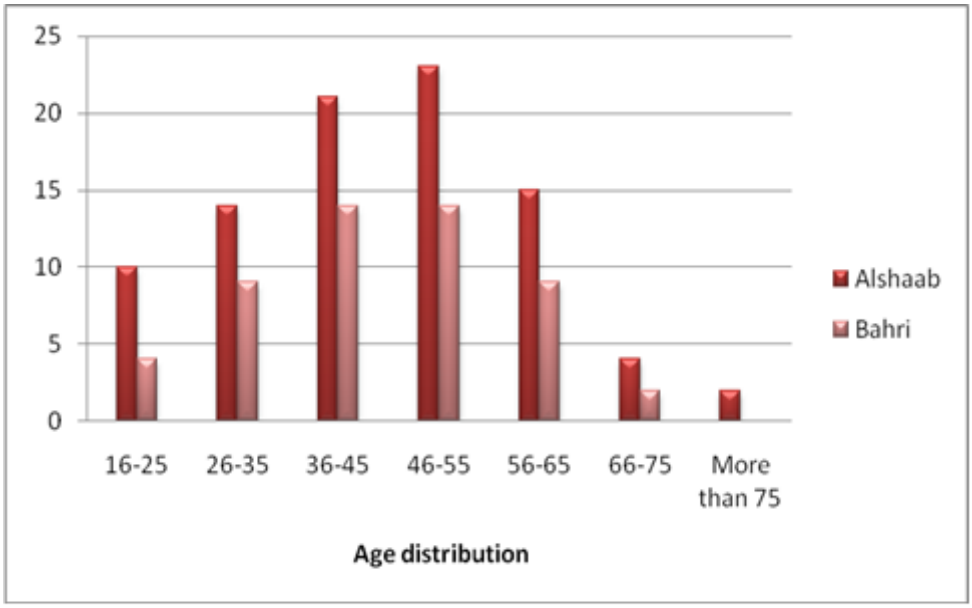

Figure No 1.a: Age distribution among asthmatic patients in the two hospitals.

Table No 1.b: Distribution of gender among asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Gender		Hospital		Total
		Alshaab	Bahri	
Male	Count	30	28	58
	% within Hospital	33.7%	53.8%	41.1%
Female	Count	59	24	83
	% within Hospital	66.3%	46.2%	58.9%
Total	Count	89	52	141
	% within Hospital	100.0%	100.0%	100.0%

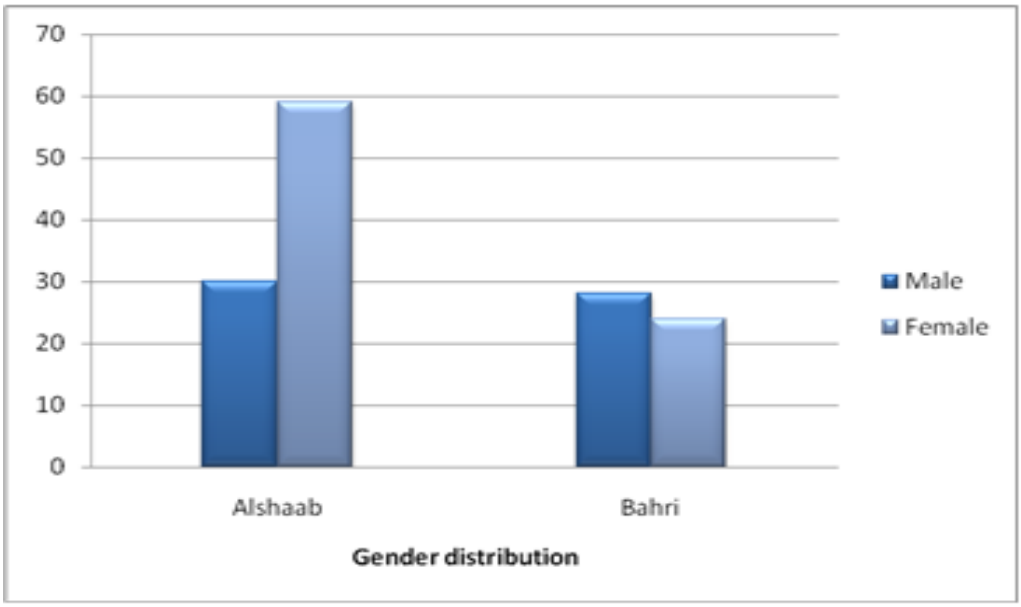

Figure No 1.b: Gender distribution among patients in both hospitals.

Table No 1.c: Occupation distribution among asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Occupation		Hospital		Total
		Alshaab	Bahri	
Student	Count	10	4	14
	% within Hospital	11.2%	7.7%	9.9%
Employed	Count	29	26	55
	% within Hospital	32.6%	50.0%	39.0%
Unemployed	Count	50	22	72
	% within Hospital	56.2%	42.3%	51.1%
Total	Count	89	52	141
	% within Hospital	100.0%	100.0%	100.0%

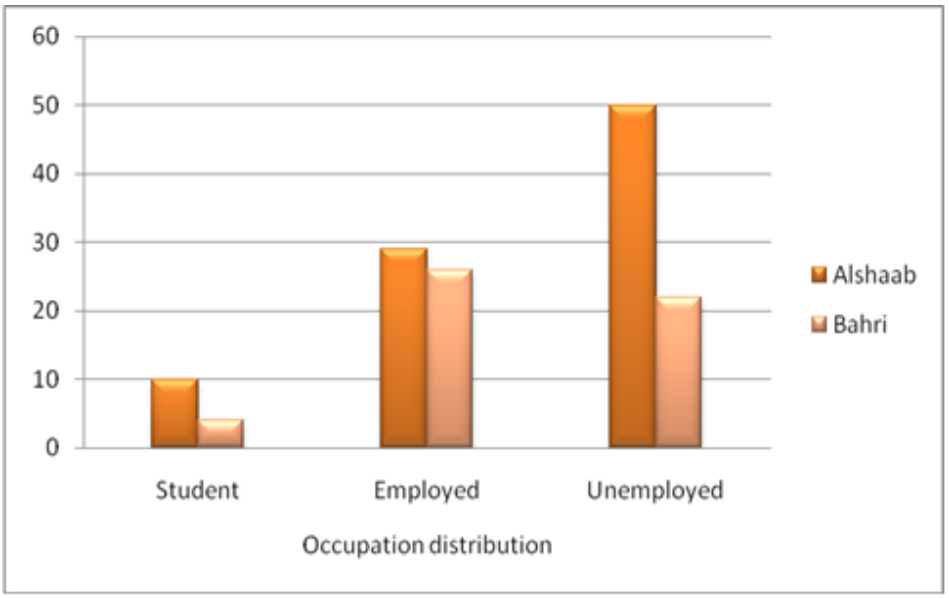

Figure No 1.c: Distribution of patient's occupation in the two hospitals.

Table No 2: Degree of asthma Control among asthmatic patients in Bahri and Alshaab Teaching Hospitals

Controllability		Hospital		Total
		Alshaab	Bahri	
Controlled	Count	4	3	7
	% within Hospital	4.5%	5.8%	5.0%
Party controlled	Count	36	13	49
	% within Hospital	40.4%	25.0%	34.8%
Un controlled	Count	49	36	85
	% within Hospital	55.1%	69.2%	60.3%
Total	Count	89	52	141
	% within Hospital	100.0%	100.0%	100.0%

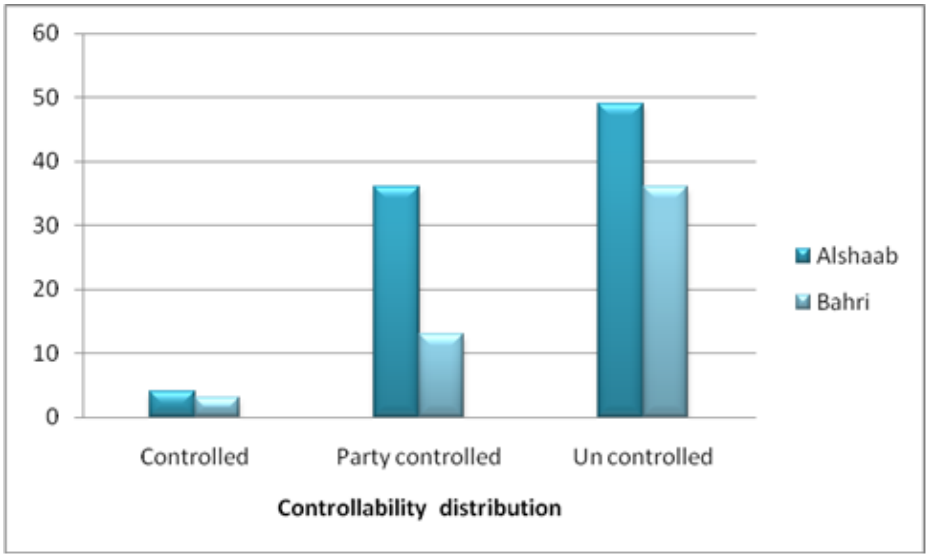

Figure No 2: Distribution of degree of asthma controllability among asthmatic patients in the two hospitals.

Table No 3: Distribution of patients with clinical indication to use an ICS preventer therapy among asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Clinician indication to use an ICS		Hospital		Total
		Alshaab	Bahri	
Yes	Count	72	35	107
	% within Hospital	81.8%	67.3%	76.4%
No	Count	16	17	33
	% within Hospital	18.2%	32.7%	23.6%
Total	Count	88	52	140
	% within Hospital	100.0%	100.0%	100.0%

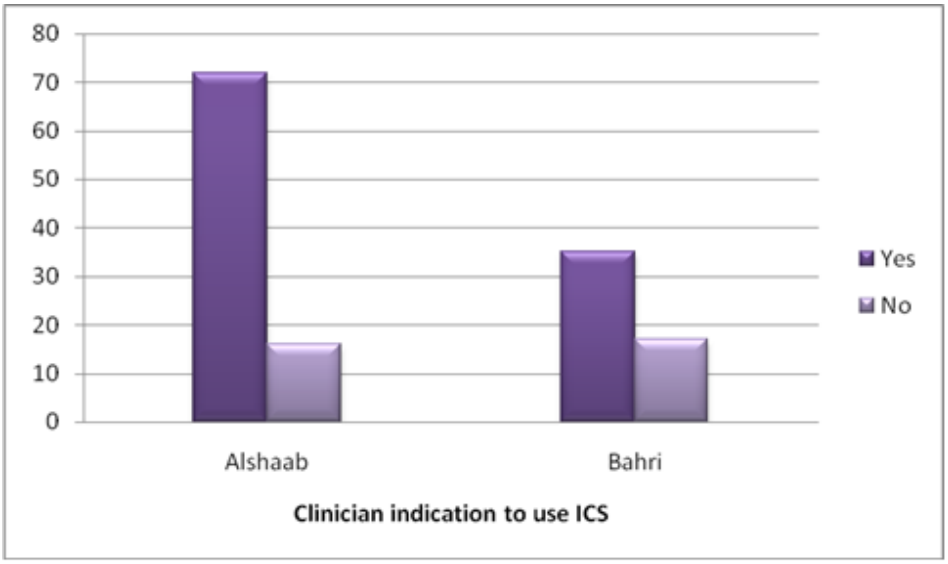

Figure No 3: Distribution of patients with clinical indication to use an ICS preventer therapy among asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Table No 4: Distribution of patients who are using ICS preventer therapy among asthmatic patients in Bahri and Alshaab Teaching Hospitals, who an ICS is indicated for them.

Use of preventer inhaler		Hospital		Total
		Alshaab	Bahri	
Yes	Count	67	30	97
	% within Hospital	75.3%	57.7%	68.8%
No	Count	22	22	44
	% within Hospital	24.7%	42.3%	31.2%
Total	Count	89	52	141
	% within Hospital	100.0%	100.0%	100.0%

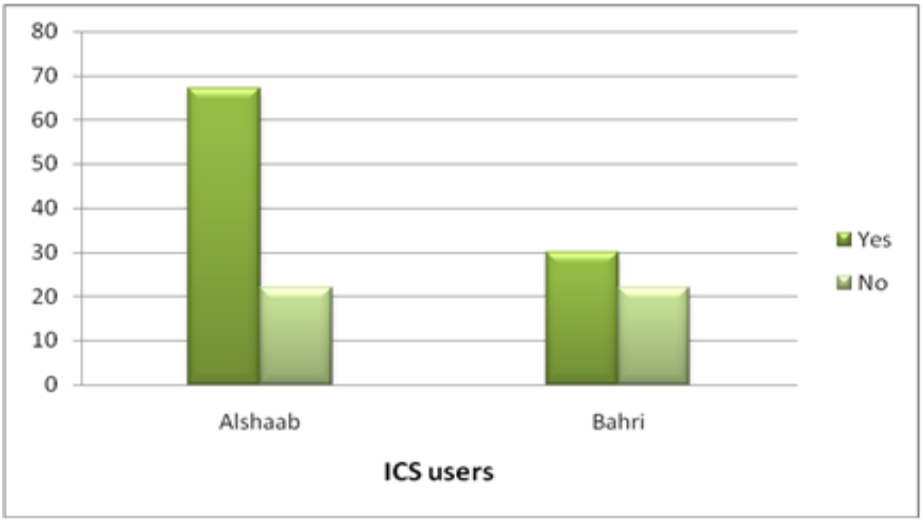

Figure No 4: Distribution of patients who are using ICS preventer therapy among asthmatic patients in Bahri and Alshaab Teaching Hospitals, who an ICS is indicated for them.

Table No 5: Types of ICS preventer therapy used by asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Types of preventer used		Hospital		Total
		Alshaab	Bahri	
Budesonide/formetrol	Count	61	32	93
	% within Hospital	84.7%	88.9%	86.1%
Fluticasone	Count	1	0	1
	% within Hospital	1.4%	.0%	.9%
Fluticasone/salmetrol	Count	10	4	14
	% within Hospital	13.9%	11.1%	13.0%
Total	Count	72	36	108
	% within Hospital	100.0%	100.0%	100.0%

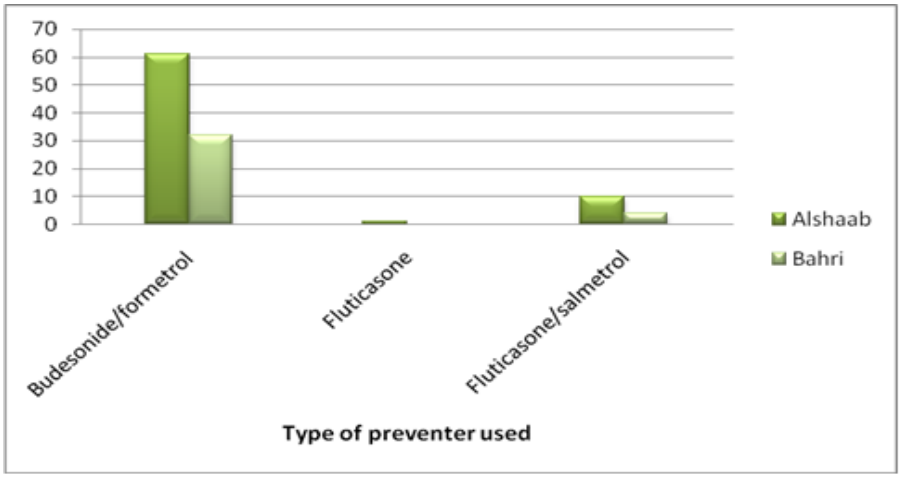

Figure No 5: Types of ICS preventer therapy used by asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Table No 6: Dose regimen of ICS therapy among asthmatic patients in Bahri and Alshaab Teaching Hospitals.

How many puffs do you use per day		Hospital		Total
		Alshaab	Bahri	
One puff /BD	Count	36	22	58
	% within Hospital	50.0%	61.1%	53.7%
Two puff /BD	Count	33	14	47
	% within Hospital	45.8%	38.9%	43.5%
Three puff /BD	Count	2	0	2
	% within Hospital	2.8%	.0%	1.9%
Two puff/ TDS	Count	1	0	1
	% within Hospital	1.4%	.0%	.9%
Total	Count	72	36	108
	% within Hospital	100.0%	100.0%	100.0%

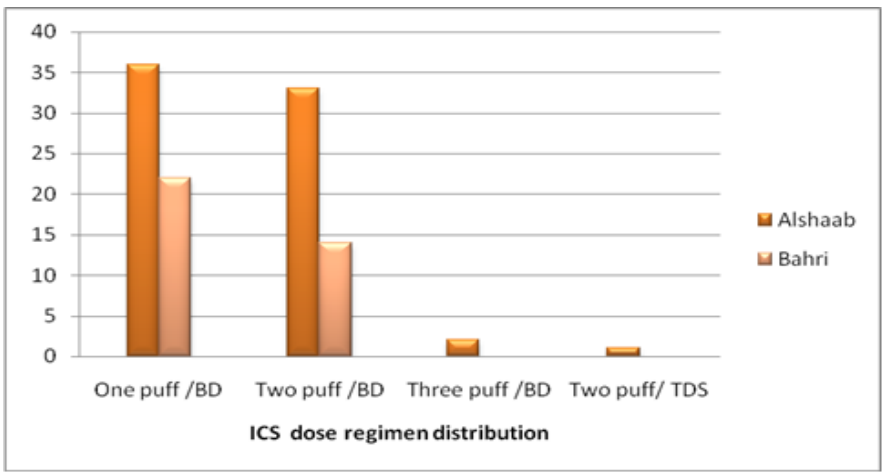

Figure No 6: Dose regiment of ICS therapy among asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Table No 7: regularity of ICS use among asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Do you use your preventer regularly		Hospital		Total
		Alshaab	Bahri	
Yes	Count	38	11	49
	% within Hospital	53.5%	30.6%	45.8%
No	Count	33	25	58
	% within Hospital	46.5%	69.4%	54.2%
Total	Count	71	36	107
	% within Hospital	100.0%	100.0%	100.0%

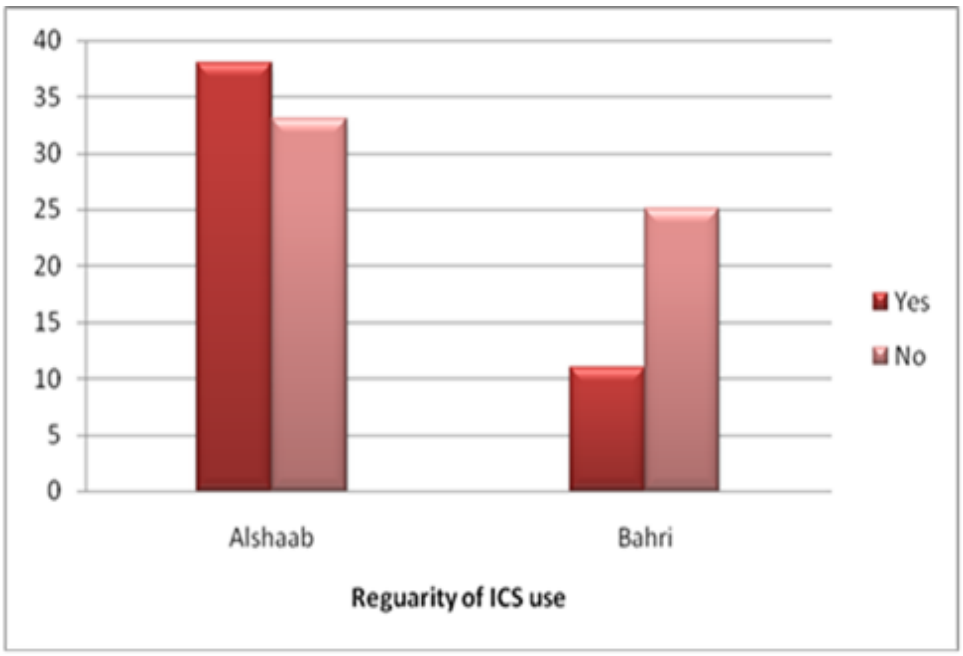

Figure No 7: regularity of ICS use among asthmatic patients in Bahri and Alshaab Teaching Hospitals.

Table No 8: Distribution of patients who have regular review among asthmatic patients in the two Teaching Hospitals, Alshaab and Bahri.

Do you have a regular review		Hospital		Total
		Alshaab	Bahri	
Yes	Count	36	14	50
	% within Hospital	40.4%	26.9%	35.5%
No	Count	53	38	91
	% within Hospital	59.6%	73.1%	64.5%
Total	Count	89	52	141
	% within Hospital	100.0%	100.0%	100.0%

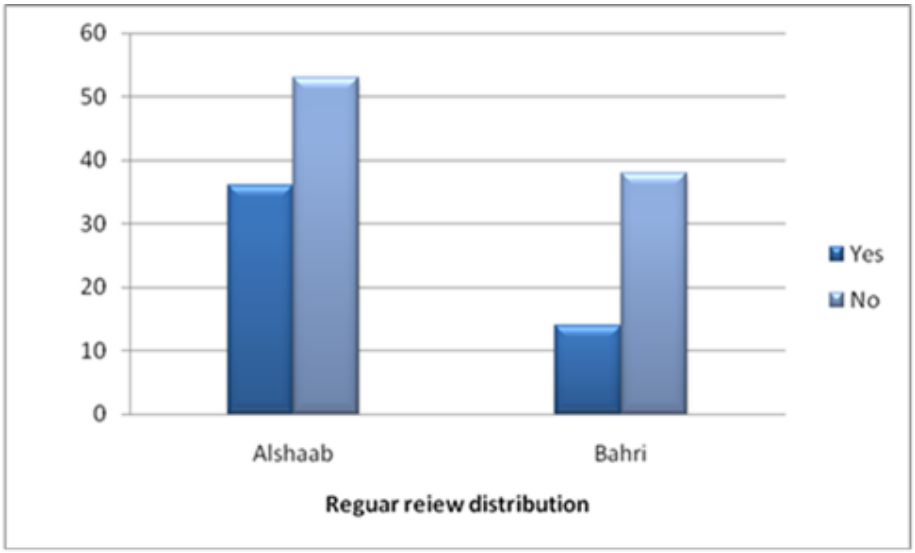

Figure No 8: Distribution of patients who have regular review among asthmatic patients in the two Teaching Hospitals, Alshaab and Bahri.

Table No 9: Distribution of patients with full inhaler technique among asthmatics who are using salbutamol PMDI, in the two Teaching Hospitals.

Full inhaler technique		Hospital		Total
		Alshaab	Bahri	
Yes	Count	17	8	25
	% within Hospital	21.0%	17.8%	19.8%
No	Count	64	37	101
	% within Hospital	79.0%	82.2%	80.2%
Total	Count	81	45	126
	% within Hospital	100.0%	100.0%	100.0%

Table No 10: Distribution of essential steps performance among asthmatic patients who are using salbutamol PMDI.

Essential steps performance		Hospital		Total
		Alshaab	Bahri	
Yes	Count	39	13	52
	% within Hospital	48.1%	28.9%	41.3%
No	Count	42	32	74
	% within Hospital	51.9%	71.1%	58.7%
Total	Count	81	45	126
	% within Hospital	100.0%	100.0%	100.0%

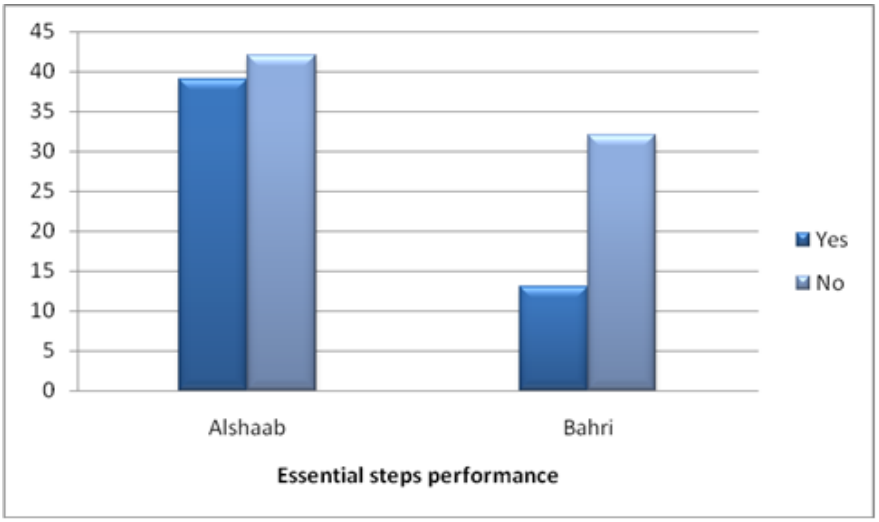

Figure No 10: Distribution of essential steps performance among asthmatic patients who are using salbutamol PMDI.

Table No 11: Distribution of Exhalation to residual volume among asthmatic patients in the two Hospitals.

Exhale to residual volume		Hospital		Total
		Alshaab	Bahri	
Yes	Count	28	25	53
	% within Hospital	34.6%	55.6%	42.1%
No	Count	53	20	73
	% within Hospital	65.4%	44.4%	57.9%
Total	Count	81	45	126
	% within Hospital	100.0%	100.0%	100.0%

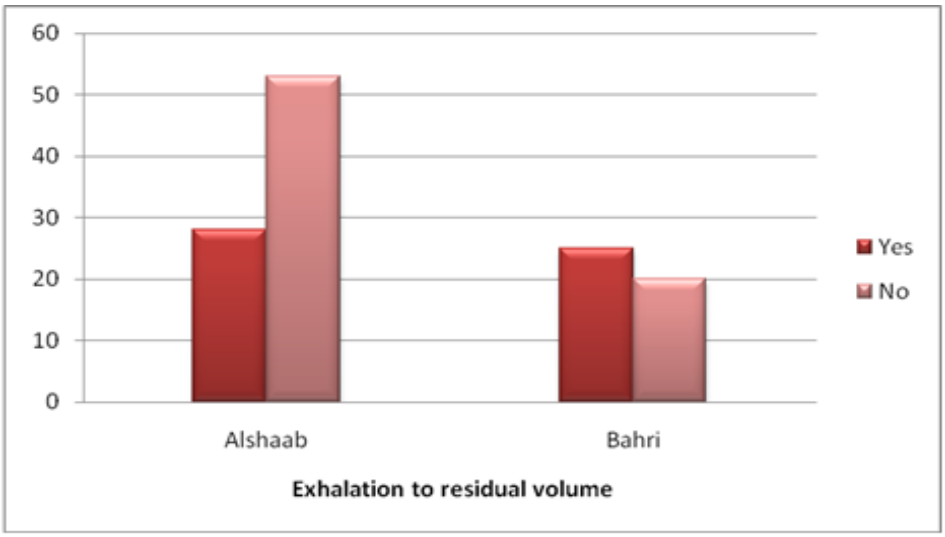

Figure No 11: Distribution of Exhalation to residual volume among asthmatic patients in the two Hospitals.

Table no 12: Statistical analysis of the association between ICS preventer use and regular review.

Hospital	Are you taking any preventer inhaler	Do you have a regular review		Total
		Yes	No	
Alshaab	Yes	32	35	67
	No	4	18	22
	Total	36	53	89
Bahri	Yes	10	20	30
	No	4	18	22
	Total	14	38	52

Table No 13: Statistical analysis of the association between level of asthma control and patients who have regular review.

Hospital	Controllability	Do you have a regular review		Total
		Yes	No	
Alshaab	Control	2	2	4
	Party control	12	24	36
	Un control	22	27	49
	Total	36	53	89
Bahri	Control	1	2	3
	Party control	3	10	13
	Un control	10	26	36
	Total	14	38	52

Table No 14: Statistical analysis of the association between preventer use and level of asthma control.

Hospital	Controllability	Use of preventer inhaler		Total
		Yes	No	
Alshaab	Control	4	0	4
	Party control	25	11	36
	Un control	38	11	49
	Total	67	22	89
Bahri	Control	1	2	3
	Party control	7	6	13
	Un control	22	14	36
	Total	30	22	52

Table No 15: Statistical analysis of the association between performing the essential steps and level of asthma control.

Hospital	Controllability	Essential steps		Total
		Yes	No	
Alshaab	Control	2	2	4
	Party control	18	12	30
	Un control	19	28	47
	Total	39	42	81
Bahri	Control	0	3	3
	Party control	5	5	10
	Un control	8	24	32
	Total	13	32	45

DISCUSSION

This research focused on assessing the use of asthma medications among asthmatics attending two teaching hospitals in Khartoum state. It focuses on the assessing of current clinical control preferably through the past four weeks, dose regimen of the preventer therapy and the inhaler technique of the PMDI reliever.

In this study, Patient's age ranges between 16 -80years old. The majority of patients attended the study were in the age of 46-55 years old and 36-55 in Alshaab and Bhri Hospitals respectively (table 1.a). Most of them are female, 66.3% for Alshaab Teaching Hospital and 53.8% male for Bahri Teaching Hospital (figure 1.b). The majority of patients 56.2% coming to Alshaab hospital during the study were un employed, either retired or for other reasons, while in Bahri Hospital the majority 50% were employed as shown in (figure 1.c).

In both hospitals the majority of patients 55.1% in Alshaab and 69.1% in Bahri, have their asthma uncontrolled as shown in (figure 2). Although clinical control is achievable target; large number of patients have not yet benefited from the advances in asthma treatment. The British guide lines for pharmacological management of asthma in adults state that; inhaled corticosteroid should be considered for adults with any of the following asthma related features: exacerbations of asthma in the last two years, using inhaled β_2 agonists three times a week or more,symptomatic three times a week or more or waking one night a week.[7]

Single combination inhaler (SMART) is widely used rather than inhalers containing ICS and long acting b2-agonist in apart. **Symbicort** (160/4.5Mg) budesonide/formetrol and **seretide** (100/50) or (250/50Mg) fluticasone/salmetrol respectively, are commonly prescribed by physician. The majority of patients 81.8% of Alshaab and 67.3% of Bahri an ICS therapy is

indicated for them as shown in (table 3), only 75.3% of Alshaab and 57.75 of Bahri Hospital patients are using it as shown in (table 4) and only 53.5% of Alshaab and 30.6% of Bahri patients are using it regularly as shown in (table 7), Although Global Strategy for Asthma Management and Prevention (GINA) stated that Inhaled Corticosteroids (ICS) are the most effective controller medications currently available. This study found that there is significant association preventer use among asthmatics and level of asthma control, and in this study considerable proportion of asthmatic patients are not compliant to medications and this directly affect the overall clinical control of the disease (table 14). This result is similar to another study finding that the level of asthma control was directly proportional to adherence rate.[24]

Different types of inhaled corticosteroid therapy are available, only four types of inhalers were assessed which are the common types used. Those are budesonide, fluticasone of different strength (50,125 and 250Mg), fluticasone/ salmetrol (250/50Mg and 100/50Mg) and fluticasone /formetrol (160/5). In this study, the majority (86.1%) of patients studied in the two hospitals were using fluticasone/formetrol inhaler (table 5).

In both hospitals, ICS dose regimen range between 2 PUFF/BD and 1/PUFF/BD (figure 6). The British guidelines referenced the dose of ICS to Beclometasone Di Propionate-Hydrofuroalkane (BDP-HFA).[9]

ICS should be started at dose appropriate to the severity of the disease. In adult, a reasonable starting dose will usually be 400Mcg BDP per day and then to be titrated to the lowest dose at which effective control of asthma is maintained. Regarding **Symbicort** (fluticasone /formetrol**)**, the strength available in Sudan market is (160/4.5).The manufacturer recommends 1PUFF/BD as starting dose then stepped up according to clinician judgment.
Among patients attended Alshaab Hospital, 59.6% have regular review, compared to 73.1% of patients in Bahri hospital (table 8). Before initiating a new drug, therapy practitioners should check adherence with existing therapies, inhaler technique and eliminate trigger factors.[11], in this study it is found that only 32 of 67 regular preventer user have regular review; while only 10 of 30 patients who are using their ICS preventive therapy have regular review (table 12).In study done in Nigeria to assess level of asthma control among adult patients, one of the study finding is that; uncontrolled asthma is strongly associated with adherence to ICS therapy andrecommends that; regular assessment of asthma control at every

clinic visit should be promoted to identify those with poor control, and to institute the appropriate therapy needed to achieve clinical control.[18]

Salbutamol is a short acting β_2-agonist that is used as a reliever medication, it is presented in different pharmaceutical devices.in this study the researcher assessed PMDI. It is found that in selected adult patients at step 3 (figure.1.a) who are poorly controlled or in selected adult patients at step 2 (above BDP 400 micrograms/day and poorly controlled), the use of budesonide/formoterol in a single inhaler as rescue medication instead of a short-acting β_2 agonist, in addition to its regular use as controller therapy has been shown to be an effective treatment regimen.[10] In this study 91% and 87% of Alshaab and Bahri Patients are using salbutamol PMDI as quick reliever, only 21% and 17.8% of patients have full inhaler technique in Alshaab and Bahri hospitals (table 9), 48% among Alshaab patients and 29% among Bahri patients performed the three essential steps of inhaler technique correctly. In a study done by J. Van Palen *et al* to evaluate inhaler technique in adults with COPD who are using PMDI, only 60% of patients were able to perform all essential inhaler action satisfactory, the study conclude that many patients are using their PMDI in effectively and most of them made crucial mistakes.[25] These finding are similar to our results in which 65.4% of Alshaab and 44.4% of Bahri patients fail to exhale to residual volume before inhalation action (table 11).

Another study found that PMDI was miss used by 71% of patients,of which 47% was due to poor coordination of actuating the device and slow deep inhalation of the medication from the inhaler,[22] this result is similar to our finding in which considerable number of patient; 51.9% and 71.1% of Alshaab and Bahri patients mistake in one of the essential steps that include poor coordination of actuating the device and slow deep inhalation (table 10).This study high lights the importance of evaluating inhalation technique. Different studies correlate between inhaler technique and level of asthma control. In this study it is found that there is significant association between asthma controllability and the ability of patients to use their PMDI correctly (table 15), this finding is similar to a study done by Levy ML.*et al.*, aimed to assess the relationship between asthma control and patients ability to use their prescribed PMDIs, it concludes that patients who are able to use PMDI correctly have better asthma control.[23]

CONCLUSION

- This study was conducted to assess the rational use of asthma medications among asthmatic patients in Alshaab and Bahri Teaching Hospitals. The results highlighted that large number of patients have not yet benefited from advances in asthma treatments.
- Although asthma control is achievable goal, patients may have different goals and may wish to balance the aim of asthma management against potential side effects in convenience of taking medications necessary to achieve perfect control.
- 81.1% of Alshaab and 67.3% of patients in the 2 hospitals are indicated to use ICS preventive therapy. Single combination inhaler (SMART) is the commonly indicated ICS between the patients of the two hospitals as it has the advantage of combining the benefits of steroids as anti-inflammatory and long acting β_2-agonist (LABA) as bronchodilator in one convenient preparation. Although of the proven results of (SMART) therapy to provide asthma control, only 53.5% and 30.6% of Alshaab and Bahri patients are using it regularly.
- The majority of the patients in the two hospitals were indicated to have low dose of inhaled corticosteroid,only 40.4% of Alshaab and 26.9% of Bahri patients have regular review and to be assessed whether their asthma under control or on the line and to consider step wise approach to meet the goals.
- This study revealed that only one third, that is to say, 21% of Alshaab and 17.8% of Bahri patients have full PMDI inhaler technique, 48, 1% of Alshaab and 28.9% of Bahri, patients have performed the essential steps correctly and 34.6% and 55.6% of Alshaab and Bahri patients respectively succeeded to exhale before inhalation step.
- Significant association between regular review, ICS use, performance of the essential steps and degree of asthma control.

RECOMMENDATIONS

- Asthmatic patients must be regularly reviewed to assess their current clinical control.
- Stepwise approaches and the use of ICS should be considered by the clinician and the patients.
- Patients should be awarded about the use full ness of ICS to their asthma control, and their role of decreasing mortality and morbidity rate.
- Patients prescribed PMDI should be carefully instructed about inhaler technique and have their ability to use their inhaler tested.

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