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Research Article

ASSESSMENT OF INHALER DEVICES TECHNIQUE AMONG ADULT ASTHMATIC PATIENT THAT VISIT PULMONARY CLINIC AT DAMMAM CENTRAL HOSPITAL AND QATIF CENTRAL HOSPITAL CROSS-SECTIONAL STUDY 2019-2020

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Abstract:

Background: Bronchial asthma is a major health problem nationally and internationally. Bronchial asthma managed usually by inhaler therapy to control symptoms. Correct use of the inhaler devices is important as the incorrect use of the inhaler devices leads to poor control of the disease. **This study aimed** to evaluate the technique of inhaler devices among asthmatic adult Patient that visit Pulmonary clinic at Dammam Central Hospital and Qatif Central Hospital. **Methods:** This is a cross-sectional observational study among asthmatic patient that attend pulmonary outpatient clinics at Dammam central hospital and Qatif central hospital. Questioners were filled by the patient about the demographical data and the level of control of the disease then the inhaler technique for each patient was assessed using a validated checklist. **Result:** From 106 asthmatic patients, Only 16 % of patients use the inhaler correctly. According to asthma control test 52 (49.06%) of the patient was uncontrol, 36 (33.96%) was partially control and 18 (16.98%) was uncontrol. 97 patients (91.5%) received education about the use of inhalers. There was a significant relationship between the control of the disease and the correct use of inhaler devices. Also, there was a significant relationship between the higher level of education and the correct use of inhaler devices. **Conclusion:** Improper use of inhaler devices among asthmatic patients was observed in this study. And this is associated with improper control of the disease.

Keywords: Asthma, Inhaler technique, Meter dose inhaler, Dry powder inhaler, Trubohaler, Saudi Arabia

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INTRODUCTION:

Bronchial asthma (BA) is a chronic inflammatory disease of the airways associated with bronchial hyper-responsiveness and reversible airflow obstruction [1]. It is distinguished by varying and recurring symptoms, airway obstruction, bronchial hyperresponsiveness, and basic inflammation [2,3]

BA is a major health problem nationally and internationally. It has been reported that it affects 339 million people, and the prevalence is rising [4]. In addition to the social effect of asthma, there are significant economic costs. These include costs related to health services as well as the loss of school and work time, which leads to poor scholastic performance and decreased productivity. Asthma care is most expensive when the patient is treated in the hospital and emergency departments [5].

In Saudi Arabia, it affects more than 2 million people. The prevalence of asthma among adults in Saudi Arabia is unknown. On the other hand, the prevalence of asthma in children ranges from 8% to 25% [6]

BA is managed usually by inhaler therapy; Drug inhalation is an important and common mode of administration of drugs used in the management of Asthma and other obstructive airway diseases [7].

Inhaled therapy is the cornerstone in the management of asthma and chronic obstructive pulmonary disease (COPD). There are two major groups of inhaler devices: metered-dose inhalers (MDI) and dry powder inhalers (DPI). Numerous devices have been created and each one has specificities on how to prepare the dose and distribute the medication to the airways. Although different devices have technological improvements to airway drug delivery, important limitations remain [8]. Decades after the introduction of inhaler devices, their incorrect use remains an obstacle to achieve optimal disease outcomes [9].

The correct use of inhaler devices is one of the most important aspects to be taken into account when evaluating individuals with asthma or COPD, and guidelines [10], [11] highlight the significance of evaluating inhaler technique to enhance the effectiveness of drug delivery.

A Previous study was conducted in Portugal reported that the frequency of inhaler technique errors was high

and no device was preferred by the patients over the others. However, Using the preferred inhaler device was not associated with fewer errors [12]. Another study in India reported that only a few participants perform all the important steps of MDI's technique [13] Also, less than half of the sample correctly follow the inhalation technique in a study was done in Brazil [14]

Three studies were conducted in Riyadh, Saudi Arabia and all revealed very poor inhaler technique among the participants [1,15,16]. Study was done in Taif also reported the same results [17].

Therefore, The aim of this study to assess the inhaler devices technique among Adult asthmatic patients attending outpatient Pulmonary clinics at Dammam central hospital and Qatif Central hospital, Eastern provenance, Saudi Arabia, and the risk factors that may lead to improper technique.

METHODOLOGY:***Study design and participants***

This is a cross-sectional observational study conducted at Dammam central hospital (DMC) and Qatif central hospital (QCH). From October 16, 2019, to January 20, 2020. We enrolled Asthmatic patients more than 18 years old who visited the Pulmonary clinic at Dammam central hospital and Qatif central Hospital of both sexes being treated with at least any one of the anti-asthmatic medications. We excluded patients without documented diagnosis of bronchial asthma and Patient dependent on the caregiver.

Ethical approvals and considerations

This study was approved by the ministry of health Central Institutional Review Board (IRB) (REF. 2019-0143E). Consents were taken from all participants.

Instruments and data collection

Interview questionnaires were filled by the patient. The questionnaire covered information that related to gender, age, marital status, follow up with the doctor, education level, emergency department visits, duration of asthma, received asthma health education, and devices used. Then Patients were asked to use their inhaler devices and their inhaler technique was observed and assessed using a validated checklist as shown in figure 1.

Inhaler device checklist⁽¹⁾**Use of a pressurized metered-dose inhaler**

1. Shake the canister
2. Hold the canister upright at the opening of the mouth
3. Begin a slow breath
4. Actuate the MDI once while continuing with a slow breath
5. Inhale to total lung capacity
6. Hold the breath for at least 4 seconds

MDI with spacer

1. Remove the cap of the spacer.
2. Remove the cap of the puffer. Shake the puffer 5 or 6 times.
3. Insert the puffer in the hole at the back of the spacer.
4. Blow all your breath out until your lungs are empty.
5. Insert the spacer mouthpiece into the mouth
6. Press the down once on the puffer's canister.
7. Slowly breathe in from the spacer full breath.
8. Hold your breath for at least 4 seconds.

Using the Turbuhaler

1. Unscrew the cover and remove it.
2. Holding the Turbuhaler upright, turn the colored wheel one way and back the other way until it clicks.
3. Breathe out normally.
4. Put the mouthpiece between your lips and tilt your head back slightly.
5. Breathe in deeply and forcefully.
6. Hold your breath for 10 seconds

Diskus

1. Open the device
 2. Slide the lever
 3. Exhale away from the device, to empty lung
 4. Place mouthpiece between teeth and lips
 5. Inhale rapidly and fully.
-

Figure 1: Validated checklist used in the current study

Statistical analysis

The data were analysed using SPSS (Statistical Package for Social Sciences Version 22.). A reliability test was done using Cronbach's Alpha and the data was proved to be reliable. Frequency tables were drawn to explore the findings (frequencies, percentages, measures of central tendencies, and dispersion). The cross-tabulation analysis was performed to determine the prevalence and the pattern and the use of inhalers. The correct and incorrect use of inhalers was tested as regards the advice reception and the source of advice. All statistical tests (Chi-square test and Fisher exact test were considered significant if $p < .05$).

RESULTS:

The current study included a total of 106 asthmatic patients, representing all asthmatic patients presented and treated in the outpatient clinics for 3 months. The mean age of patients was 44.27 years and 46.2% of patients were older than 50 years. Females patients represented 77.4 % and 22.6% were males. 62.3 % of the participant were married.

Regarding the educational level of the patients, 34.9% were highly educated (25.5 were graduated and 9.4 were post-graduate level), 17 % received elementary education and 18.9% were non-educated. As regards the duration of asthma, 50.9% were suffering from asthma for more than 10 years and 54.7% of them suffered from other comorbidities. The demographic and clinical data of the enrolled participants are summarized in *table 1*.

Table 1: Demographic and clinical data of the enrolled participants.

Characteristic	Level (years)	Number	%
Age	18- 30	17	16.0
	31-40	21	19.8
	41-50	19	17.9
	>50	49	46.2
Sex	Male	24	22.6
	female	82	77.4
Marital status	divorce	8	7.5
	Married	66	62.3
	single	26	24.5
	widow	6	5.7
Education	Non-educated	20	18.9
	Elementary school	18	17.0
	intermediate school	12	11.3
	secondary school	19	17.9
	Graduate	27	25.5
	Postgraduate	10	9.4
Duration of illness	<5	32	30.2
	5_10	20	18.9
	>10	54	50.9
Comorbidities	No	48	45.3
	Yes	58	54.7

According to the asthma control test, 52 (49.06%) of the patient were uncontrolled (*figure 2*), 36 (33.96%) were partially controlled and 18 (16.98%) were uncontrol.

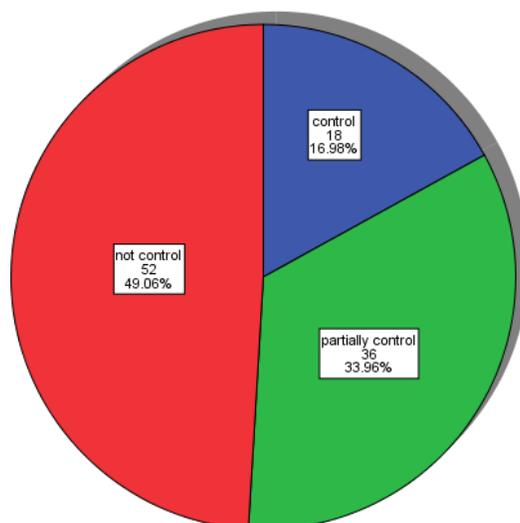


Figure 2: distribution of asthma control among enrolled participants.

The current study showed that; 81.1% of the asthmatic patients had regular visits to the physician while 18.9% did not visit their physicians regularly. 97 patients (91.5%) received education about the use of inhalers. Regarding the source of education, 80 patients (75.5%) received education about the use of inhalers from their doctor, 4.7 % received education from the pharmacist, 2.8% from a nurse and 8.5% received education from more than 1 health care practitioner. Regarding inhaler use 79.2% use the MDI, 9.4% use MDI with spacer, 48.1% use the Turbuhaler and 6.6% use the Diskus inhaler. On the other hand, only 16 % of patients use the inhaler correctly as shown in *table 2*.

Table 2: Inhaler use among enrolled participants.

Characteristic	Level (years)	Number	%
Education about inhaler use	yes	97	91.5
	no	9	8.5
Source of education about inhaler	Doctor	80	75.5
	Pharmacist	5	4.7
	Nurse	3	2.8
	More than 1 health care	9	8.5
inhaler used	MDI	84	79.2
	MDI with spacer	10	9.4
	Turbuhaler	51	48.1
	Diskus	7	6.6
Correct use of the inhaler	Yes	17	16
	no	89	84

Table 3 show that There was a significant relationship between the correct use of inhaler and control of the disease. 27.8 % of controlled patients reported the correct use of inhalers while only 5.8% of the uncontrolled patient used the inhaler correctly ($p=0.018$).

Table 3: the relation between correct use of the inhaler devices and control of the disease.

		Correct use		Total	P-value	
		incorrect	correct			
Patient control	control	Count	13	5	18	0.018
			72.2%	27.8%	100.0%	
	partially control	Count	27	9	36	
			75.0%	25.0%	100.0%	
	not control	Count	49	3	52	
			94.2%	5.8%	100.0%	
	Total	Count	89	17	106	
			84.0%	16.0%	100.0%	

Also, there was a highly significant relationship between a higher level of education and the correct use of the inhaler. As, 50% of patients with master's degrees used the inhaler correctly, while only one non educated patient used the inhaler correctly ($p=0.003$) as shown in table 4.

Table 4: Relationship between a higher level of education and the correct use of inhaler devices.

		inhaler use		Total	P-value	
		incorrect	correct			
Education	Non-educated		19	1	20	0.003
			95.0%	5.0%	100.0%	
	Elementary school		17	1	18	
			94.4%	5.6%	100.0%	
	Intermediate school		12	0	12	
			100.0%	0.0%	100.0%	
	Secondary school		17	2	19	
			89.5%	10.5%	100.0%	
	Bachelor		19	8	27	
			70.4%	29.6%	100.0%	
	Master's degree		5	5	10	
			50.0%	50.0%	100.0%	
	Total		89	17	106	
			84.0%	16.0%	100.0%	

The current study showed that, there is no significant relation between correct use of inhaler and age, sex and marital status, as shown in table 5.

Table 5: Relationship between age, sex, marital status and the correct use of inhaler devices.

			Correct use		Total	P- value
			incorrect	correct		
Age groups	18_30	Count	11	6	17	0.113
			64.7%	35.3%	100.0%	
	31_40	Count	18	3	21	
			85.7%	14.3%	100.0%	
	41_50	Count	16	3	19	
		84.2%	15.8%	100.0%		
	> 50	Count	44	5	49	
			89.8%	10.2%	100.0%	
Total		Count	89	17	106	
			84.0%	16.0%	100.0%	
			inhaler use		Total	P- value
			incorrect	correct		
Sex	male	Count	19	5	24	0.467
			79.2%	20.8%	100.0%	
	female	Count	70	12	82	
			85.4%	14.6%	100.0%	
Total		Count	89	17	106	
			84.0%	16.0%	100.0%	
			Correct use		Total	P- value
			incorrect	correct		
Marital status	divorse	Coun t	6	2	8	0.648
			75.0%	25.0%	100.0%	
	Married	Coun t	55	11	66	
			83.3%	16.7%	100.0%	
	single	Coun t	22	4	26	
			84.6%	15.4%	100.0%	
	widow	Coun t	6	0	6	
			100.0%	0.0%	100.0%	
Total		Coun t	89	17	106	
			84.0%	16.0%	100.0%	

DISCUSSION:

Asthma control and management are highly dependent on the patient way of use of inhaler devices. The current study assessed the inhaler devices technique among asthmatic patients in the eastern provenance to assess the correct use of inhaler devices among asthmatic patients. Personalized

Interview to each patient was handled using a validated checklist. The present study found that; despite almost all the patients (91.5%) received education about the use of their inhaler and most of them received advice from their doctor (75.5%), this was associated with the incorrect use of inhaler devices (85%). This was in accordance with previous

studies reported either globally [12,13,14] or in Saudi Arabia [1,15,16,17].

The present study also observed poor control of the disease among patients who use the inhaler incorrectly, this was in accordance with a study done by two major academic hospitals in Saudi Arabia [1]. Also, in accordance with previous studies [14,16], the current study observed that incorrect use of the devices was highly predominant in a patient with a low level of education. Also, a study done in Nigeria showed that Patients with a higher educational qualification are more likely to use the MDI inhalers more accurately [18]

Similar to other studies, the current study found that there is no significant association between proper use of inhalers and gender, marital status, presence of comorbidities, or duration of illness [13, 19]. In contrast; a study on The influence of age and gender on the proper use of metered-dose inhalers found that males perform significantly better than females [20].

The current study proved that; only 16.98% were asthma controlled this was in accordance with a study done in Ethiopia and found that only 18% of patients were competent and almost 95% of the patients had poor asthma control [21].

The limitations of this study were the small number of participants as few numbers of patients that visit the OPD per day. Also, we could not assess the quality of teaching and the number of the educational sessions.

This shows the Important role of a health educator in teaching patients the proper use of inhaler devices. Also, this is could be solved when the health care system improves the health education program for asthma patients.

CONCLUSION:

Most asthmatic patients use inhaler devices incorrectly, this can be improved by the education of the patient especially if they receive the education from a health educator. Also, the assessment of each patient way of use is necessary to correct the technique errors. Proper inhaler technique will improve the control and will reduce the number of exacerbations on the asthmatic patient.

RECOMMENDATIONS

Similar studies should be conducted with a larger number of participants, most common errors should be identified, and assessment of patient education programs is mandatory.

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