IMPROPER TECHNIQUE OF USING TURBUHALER IN A SAMPLE GROUP OF IRAQI ASTHMATIC PATIENTS, AFFECTING FACTORS AND ITS EFFECT ON ASTHMA CONTROL

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ABSTRACT

Background: Improper use of inhaler devices had a major effect on the drug delivery and furthermore associated with uncontrolled asthma and frequent respiratory clinics and emergency units visits. Therefore assessment of the effect of the improper use of turbuhaler device in the control of bronchial asthma, and the factors that have important impact on asthma management and control. **Objectives:** To evaluate the Turbuhaler technique among asthmatic patients and to investigate the characteristics of these patients and factors associated with improper use of Turbuhaler device and its relationship with asthma control. **Methods:** A cross-sectional study of 100 patients who visited respiratory clinic at Baghdad Teaching Hospital with bronchial asthma from 1st of March 2018 to 30th of March 2019. Information was collected about demographic data and asthma control and we assessed the inhaler techniques for each patient using an inhaler technique checklist. **Results:** Among the 100 asthma patients, 50(50%) were male, 50(50%) female. There was a statistically significant association between educational defects with the gender (P value <0.05). There was a statistically significant association between educational defects with the age (P value < 0.01). There was a statistically significant association between educational defects with the education level of patients (P value < 0.01). There was a statistically significant association between educational defects with the duration of disease of the patient (P value = 0.02). There was a statistically significant association between educational defects with the disease education of the patient (P value< 0.01). There was a statistically significant association between educational defects with asthma control test (ACT) (P value< 0.01). **Conclusion:** Improper inhaler device use was associated with poor asthma control. Many factors was associated with improper technique, the modifiable factor which we improve was the asthma education.

KEYWORDS: Iraqi asthmatic patient, inhaler technique and Patient education.

INTRODUCTION

Asthma is a chronic inflammatory disorder of the airway characterized by bronchial hyperactivity to a variety of stimuli, leading to a variable degree of airway obstruction, some of which may become irreversible over many years.[1,2]

It is a clinical diagnosis based on

A history of recurrent episodes of wheeze, chest tightness breathlessness, and/or cough, particularly at night.

Evidence of generalized and variable airflow obstruction, which may be detected as intermittent wheeze on examination or via tests such as peak expiratory flow (PEF) measurement.[1,2]

Epidemiology

Asthma is one of the most common chronic diseases globally and currently affects approximately 300 million people worldwide. The prevalence of asthma has risen in affluent countries over the last 30 years but now appears to have stabilized, with approximately 10–12% of adults and 15% of children affected by the disease. In

developing countries where the prevalence of asthma had been much lower, there is a rising prevalence, which is associated with increased urbanization. The prevalence of atopy and other allergic diseases has also increased over the same time, suggesting that the reasons for the increase are likely to be systemic rather than confined to the lungs. This epidemiologic observation suggests that there is a maximum number of individuals in the community, who are likely to be affected by asthma, most likely by genetic predisposition. Most patients with asthma in affluent countries are atopic, with allergic sensitization to the house dust mite *Dermatophagoides pteronyssinus* and other environmental allergens. Asthma can present at any age, with a peak age of 3 years. In childhood, twice as many males as females are asthmatic, but by adulthood the sex ratio has equalized. The commonly held belief that children "grow out of their asthma" is justified to some extent.

Deaths from asthma are uncommon, and in many affluent countries have been steadily declining over the last decade. A rise in asthma mortality seen in several countries during the 1960s was associated with increased use of short-acting β 2 -adrenergic agonists (as rescue therapy), but there is now compelling evidence that the more widespread use of (ICS) in patients with persistent asthma is responsible for the decrease in mortality in recent years. Diagnosis and treatment of asthma in older adults is often challenged by symptom overlap with other condition (COPD, heart failure).[34]

Assessment of asthma control
The gold standard in assessing asthma control is the Global Initiative for Asthma (GINA) criteria. It is difficult to follow GINA criteria inassessing asthma control in resource poor settings because of the lack of access to pulmonary functions tests. The Asthma Control Test (ACT) questionnaire is a simple, self-administered, accessible and validated tool that is used in assessing control among asthmatics. The ACT has the added advantage that it does not require lung function assessment.[6]

Table 1.1: Asthma Control Test.
1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?.

All of the time		Most of the time		Some of the time		A little of the time		None of the time	
	1		2		3		4		5

2. During the past 4 weeks, how often have you had shortness of breath?

More than once a day		Once a day		3 to 6 times a week		Once or twice a week		Not at all	
	1		2		3		4		5

3. During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?.

4 or more nights a week		2 or 3 nights a week		Once a week		Once or twice		Not at all	
	1		2		3		4		5

4. During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?

3 or more times per day		1 or 2 times per day		2 or 3 times per week		Once a week or less		Not at all	
	1		2		3		4		5

5. How would you rate your asthma control during the past 4 weeks?

Not controlled at all		Poorly controlled		Somewhat Controlled		Well Controlled		Completely Controlled	
	1		2		3		4		5

If your score is 25, your asthma is control.
If your score is 20-24, your asthma is partial control.
If your score is 19 or less, your asthma is uncontrolled.[7]

Types of inhalers
1- Dry Powder Inhalers
A dry powder inhaler (DPI) is a breath-actuated device that delivers the drug in the form of particles contained in a capsule or blister that is punctured prior to use. This type of inhaler requires an adequate inspiratory flow rate for drug delivery, as it eliminates the need for propellants. Because of this inspiratory flow rate requirement, DPIs are not appropriate for the treatment of acute asthma attacks.

Types of DPIs
A- Turbuhaler
The turbuhaler is breath activated and has no propellant or carrier added to the medicine. This means you will hardly notice any powder in your mouth.
B- Accuhaler
Accuhaler is a breath activated device. Doses of the medicine are set into a fail strip inside the accuhaler.
C-Handihaler
The handihaler delivers the medicine Spiriva is used by people with COPD

2-Metered Dose Inhalers (MDI)
MDI inhaler are sometimes called aerosol inhaler. When the inhaler is pressed, a measured dose of medicine is released through the mouthpiece. MDI are more widely used and more familial.[8]

Table 1.2 Inhaler device check lis.[8]

Use of a turbuhaler
1. Unscrew and remove cover
2. Check dose counter
3. Twist: keep inhaler upright while twisting the grip at the base around And then back until click is heard
4. Breath out gently
5. Place mouth piece between teeth (without biting) and close lips
6. Breath in strongly and deeply

DPI advantages
No need for hand-breathing coordination because it's breath activated.
Inspiratory hold is not required.
Full inspiration is easier because there is no "cold, Freon effect".
It's simple to count the remaining drug doses.

DPI disadvantages
Only a limited variety of drugs are available to date.
Patients are not as aware of the dose inhaled as with an MDI and may distrust delivery.
Some patients may not be able to have high inspiratory flow rates needed to enable successful powder dispersion.
The high flow velocity may result in relatively high oropharyngeal impaction and deposition. If so, there is a high dose loss.
Single-dose DPIs must be reloaded before each me.[8]

Aim of study
The aim of study is to assess the effect of the improper use of turbuhaler device in the control of bronchial asthma. And the factors that affect the inhaler technique.

Patients and Methods
Type of study
This cross-sectional study was conducted at Baghdad Teaching hospital.

Timing & setting
Number of asthmatic patient's enrolled adult patients ($\geq$ 18 years old) diagnosed with asthma who visited the respiratory consulting department between 1st of March 2018 and 30th March 2019.

Methods
The enrolled No. of patients had a documented diagnosis of bronchial asthma as diagnosed by reversibility test and who were use turbuhaler. We excluded patients without a documented diagnosis of bronchial asthma and those who did not use turbuhaler. During the respiratory consulting department visit, we have taken 100 patients of bronchial asthma, 50 patients male and 50 patients female. Trained co-investigator collected information about demographic data, the patients' age, educational level, education about medication, the duration of the illness, the data were gathered on whether the patient received any formal education about asthma as a disease and, how to use their inhaler devices, The co-investigators also verified this information by reviewing the medical record of the patients and they assessed the asthma control over the last month by administering the Asthma Control Test (ACT). The co-investigators also determined whether the patient knew how to use the prescribed inhaler properly following specific steps in the check list (Table1.3). All patients were observed for two trials of using their inhalers and proper use was identified if the patient fulfilled all of the steps required.

Statistical analysis
The data collected was transferred and analyzed using IBM SPSS Statistics version 25. Descriptive statistics, such as the means and standard deviations, were used to summarize the quantitative variables.

The frequencies and percentages were used to summarize categorical variables. Chi-squared tests were used to test the association between clinical characteristics across the variables regarding asthma device use and asthma control test. P-values less than 0.05 were considered significant. Multiple logistic models were used to identify the risk factors that were associated with the improper use of asthma inhaler devices.

RESULTS

Among the 100 asthma patients, 50(50%) were male, 50(50%) female (Table 3.1). table 2 describe distribution of age, table 3describe educational status of the patient, table 4 describe duration of disease, table 5 describe disease education.

Table 1: Distribution of gender.

Gender	Frequency	Percent
Male	50	50
Female	50	50
Total	100	100

Table 2: Distribution of age.

Age	Frequency	Percent
18-30 years	30	30
31-40 years	15	15
41-50 years	20	20
More than 50years	35	35
Total	100	100

Table 3: Educational status.

	Frequency	Percent
Primary	40	40
Post Primary	35	35
Secondary	10	10
Institute	5	5
College	10	10
Total	100	100

Table 4: Describe distribution of duration of asthma.

	Frequency	Percent
1-5 years	48	48
6-10 years	40	40
More 10 years	12	12
Total	100	100

Table 5: Describe disease educational status.

	Frequency	Percent %
A	45	45
B	20	20
C	15	15
D	20	20
Total	100	100

A= patients have information disease about the asthma.
B= patient educated how to use inhaler.
C= patients have information disease about the asthma and educated how to use inhaler.
D= patients haven't information about asthma disease and not educated how to use inhaler
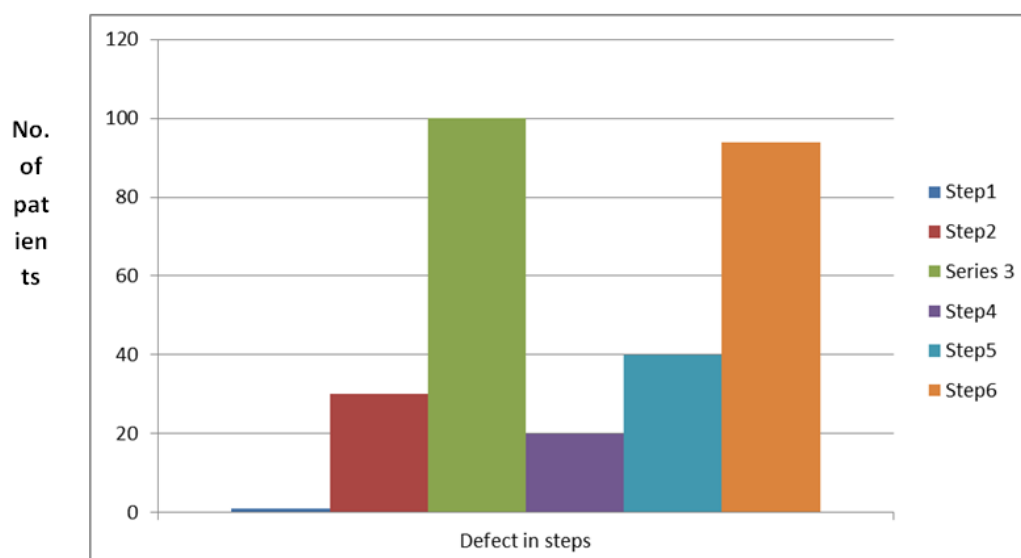
Figure (1) show defects in steps for using turbuhaler.

Figure 1: Steps defects un using turbuhaler.

Figure (2) show comparison between steps defects in using turbuhaler with the gender which is show statistically significant, especially step (3,6) (Table 1 Inhaler device check list), P value ‹0.05 significant.
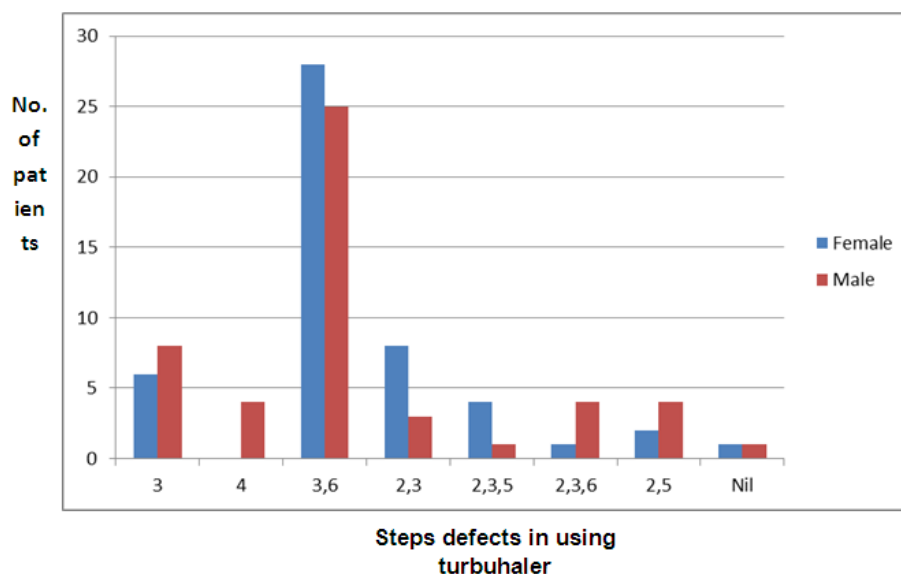
Figure 2: Steps defects un using turbuhaler *gender.

P value <0.05 Significant

Figure (3) show comparison between steps defects in using turbuhaler with the age which is show statistically significant, especially step (3,6) (Table1 Inhaler device check list), P value < 0.01 significant.
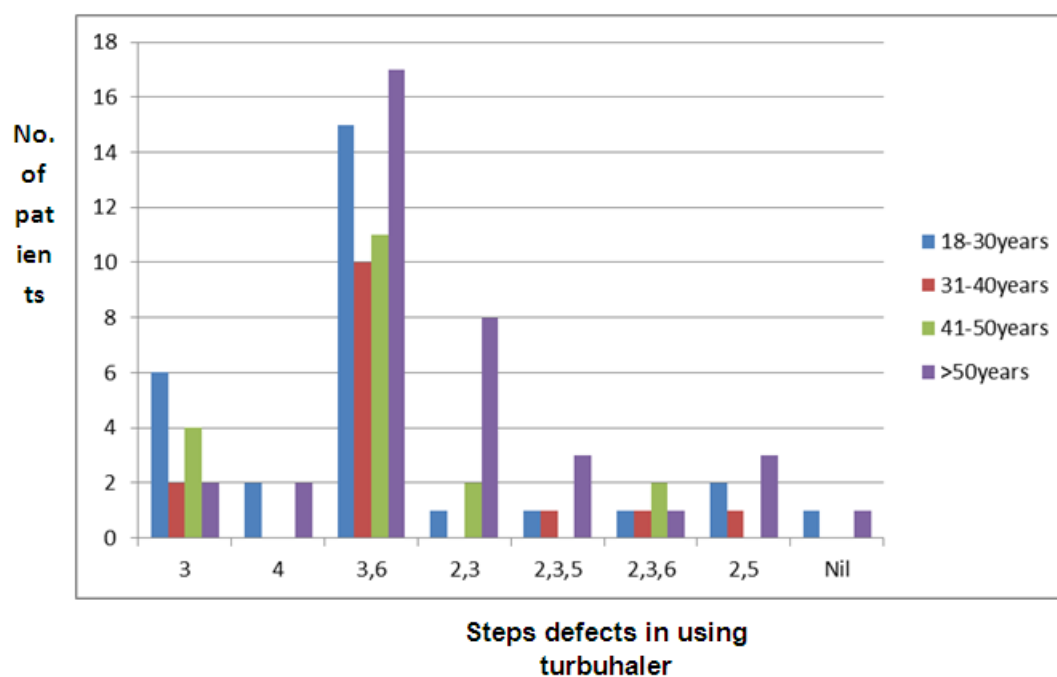

Figure 3: Steps defects un using turbuhaler * age.

P value<0.01

Figure (4) show comparison between steps defects in using turbuhaler with the education which is show statistically significant, especially step (3,6) (Table 1 Inhaler device check list), P value <0.01 significant.
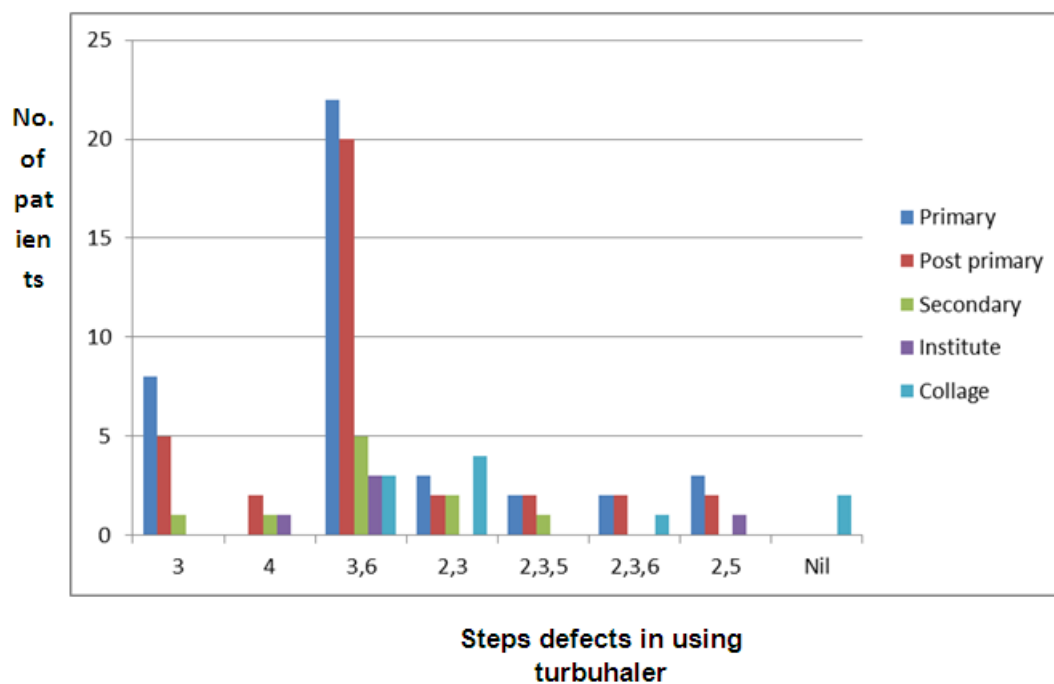
Figure 4: Steps defects un using turbuhaler * Education.

P value <0.01

Figure (5) show comparison between steps defects in using turbuhale with the duration of disease of the patient which is show statistically significant, especially step (3,6) (Table 1 Inhaler device check list), P value = 0.02 significant.
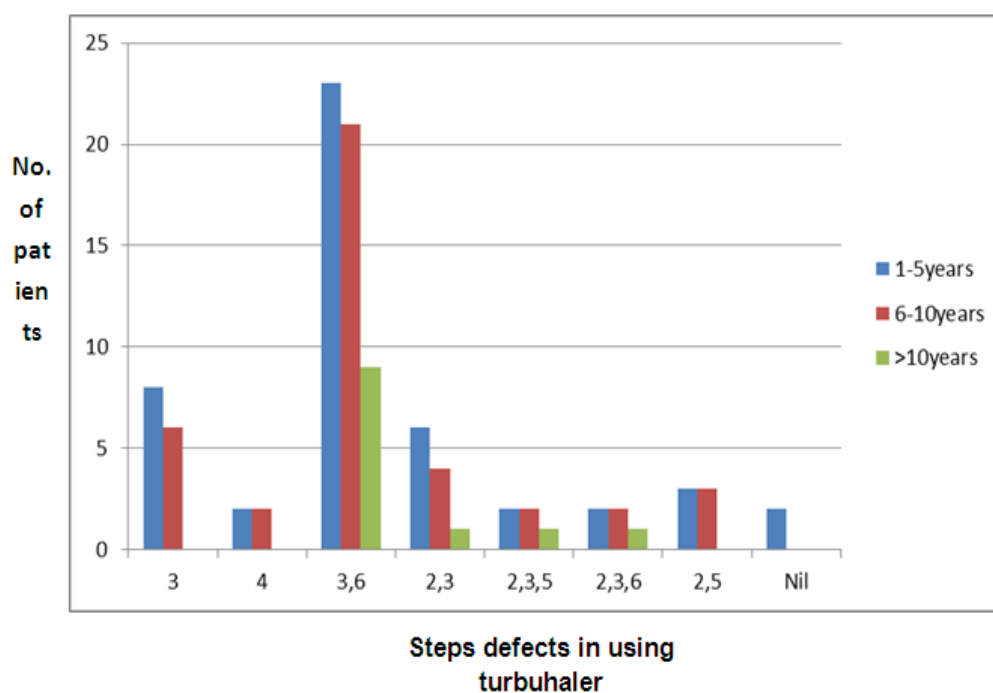

Figure 5: Steps defects un using turbuhaler * duration.

P value=0.02

Figure (6) show comparison between steps defects in using turbuhaler with the disease education of the patient which is show statistically significant, especially step (3,6) (Table 1 Inhaler device check list), P value <0.01 significant.
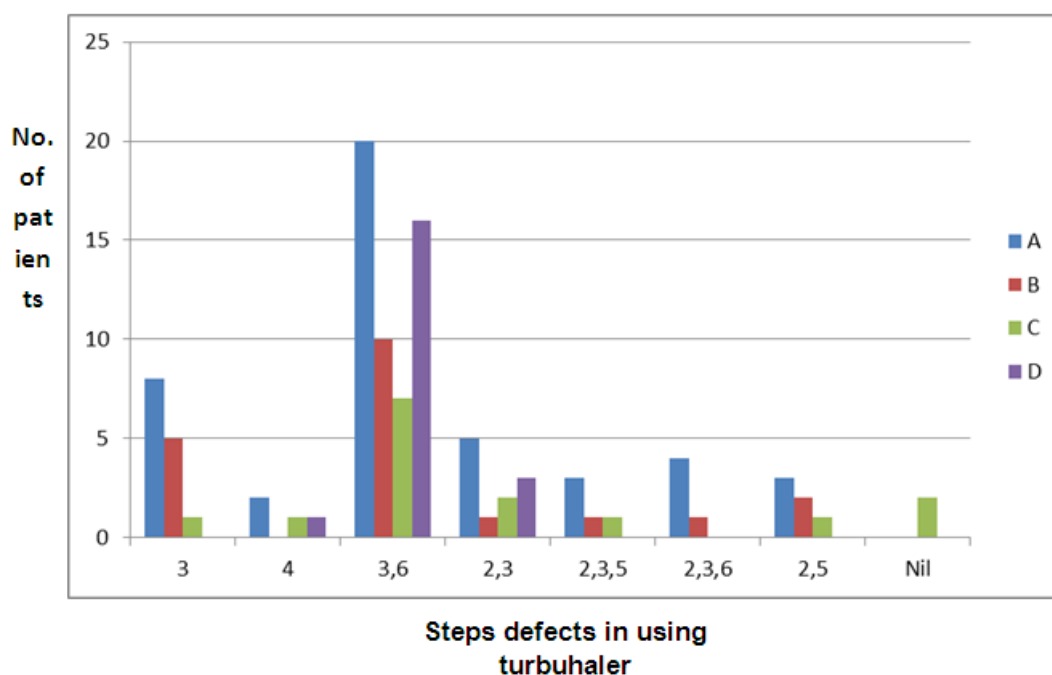
Figure 6: Steps defects un using turbuhaler * disease education.

P value<0.01

Figure (7) show comparison between steps defects in using turbuhale with asthma control test (ACT) which is show statistically significant , especially step (3,6) (Table 1 Inhaler device check list), P value <0.01 significant.
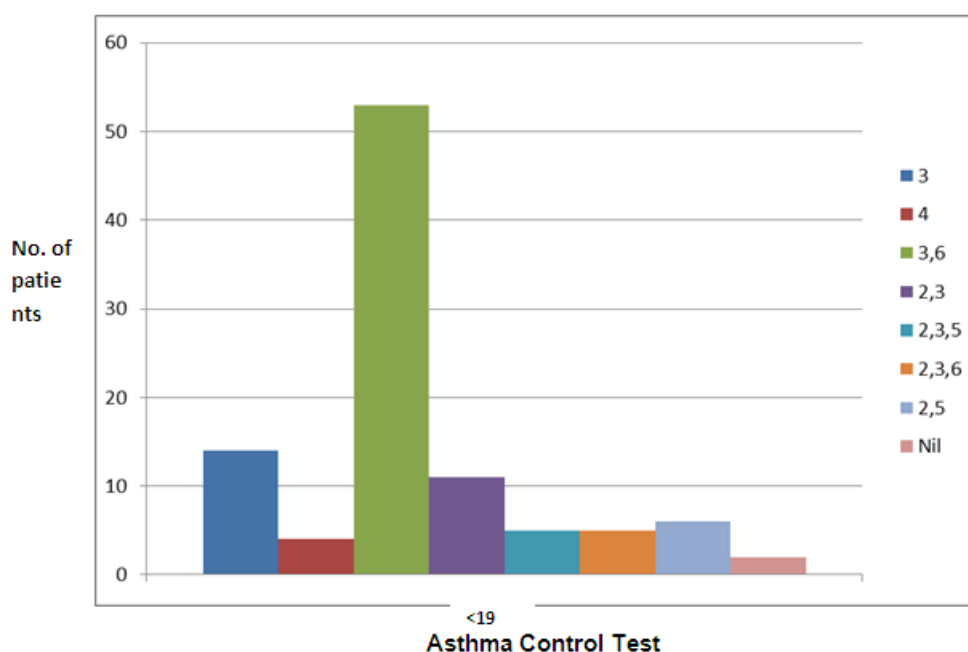

Figure 3.7: Steps defects un using turbuhaler *asthma control test P value <0.0.

DISCUSSION

Turbuhaler is commonly used by patients with respiratory diseases; the effectiveness is limited by patient's ability to use it correctly.[9] Previous studies have shown that the improper use of inhaler devices decreases drug delivery, patient's regimen adherence and drug effectiveness contributes to uncontrolled asthma and multiple the respiratory clinic visits,[10,11,12,13] This is against a literature review found that there is not enough evidence on the relationship between inhaler technique and asthma control.[14] Proper inhaler technique delivered to the patients by health care professional is very important, In our study, we found that 65% of the patients did not receive any formal education by any

health care professionals regarding the proper use of inhaler devices, approximately 35% of the patients received education about how to use the inhaler devices, this similar to Basheti IA et al,[15] (a low proportion of patients receive inhaler use education).

In our study, the majority of the defect of using turbuhaler was in step 3 and 6. Our study have shown that well educational practice results in the proper use of turbuhaler which will be more cost effective in the long-term.[16,17,18] Improper use of inhaler was mostly due to a lack of asthma education programs, This same finding in, Al-Obaidy et al and AL-Jahdali et al.[19,20] The major preventable factors for improper device use were a lack of education for asthma as a disease and how the patient use inhaler device correctly. Takemura M et al have shown that standardized asthma education programs, education focused on self-management improves inhaler device use, adherence to treatment and asthma control.[21,22]

Inefficient turbuhaler technique may lead to insufficient drug delivery and hence to insufficient lung deposition.[23]

There was significant difference in the appropriate use of device stratified by patient age or gender (P value <0.01), this similar with findings in other study by Al-Obaidy et al, and Al-Jahdali HH et al.[19,24,25] The rate of proper use significantly increased as the level of education increased (p < 0.01) significant, This same finding in Melani S et al and Aydemir Y.[10,26] The rate of correct use significantly increased with a longer duration of disease than those who had been recently diagnosed (P value=0.02), This similar to findings in Aydemir Y, and Hamdan AJ et al.[20,26]

CONCLUSION

The study reveals that improper asthma inhaler technique is common among asthmatic patients and is associated with poor asthma control. Many factors were associated with improper turbuhaler technique including gender, age, asthma education and education status. The modifiable factor which can we improve was the asthma education.

RECOMMENDATION

Before prescribing an inhaler, the doctor should ensure that the patient is well understanding the proper use of it, Our health care system should increase workout for establishing asthma national education programs and involving more doctors in those programs especially those who working in primary health care centers to educate patients on asthma as a disease and its management, particularly regarding the use of inhaler devices.

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