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Inhaler techniques evaluation among Asthma and COPD patients in United Arab Emirates

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Abstract
Introduction*: Inhalation therapy is an important and most common mode of drugs used through Inhalers in the management of Asthma and Chronic Pulmonary Obstructive Disease (COPD). Effective dose of inhalation drugs can only be administered with the correct inhaler specific technique. Improper use of inhalers by patients results in poor clinical outcome.*
Objective. *This study was to assess inhaler technique among patients of Asthma and COPD*
Subject and method. This cross section observational study was done among 150 adult patients with Asthma and COPD who attended Family Medicine Clinic, Hatta hospital. Technique was directly observed by Family physician through standard steps checklist. Data on demographics, type of inhaler used and correct steps findings were recorded.
Result. *The study result showed the majority of the patients were unable to use their inhaler properly as per standard steps. Metered dose inhaler (MDI) was most common type of inhaler used in both Asthma and COPD patients. In this study 27.3% of pMDI users, 35.1% of Diskus inhaler user and only 32.7% of Turbohaler users were able to complete all the steps. Most common error for pMDI user was failure to continue breath in deep after pressing and actuation of inhaler (57.3% patients correct). For those using DPI devices, had v short breath hold of less than 10 seconds (39.6% and 65.5% correct in Turbohaler and Diskus inhaler users respectively) was the most common error. Failure to exhale maximum (to residual volume) before inhaling through device was 2nd most common mistake.*
Conclusion. *Our findings revealed majority of patients in this study have poor inhaler technique and they use device incorrectly. These findings are consistent with other reports. Inhaler use skill should be routine review and assessment in patients with asthma and COPD at every visit and corrected if found poor and faulty.*
Keywords*. Asthma, Chronic Obstructive pulmonary disease (COPD), Dry powder Inhaler (DPI) Inhaler technique and Metered Dose Inhaler (MDI)*

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I. Introduction

Bronchial asthma is one of the most common chronic respiratory disorders among all age groups. More than 339 million people had Asthma globally in 2016. [1]. According to WHO estimates, there were 417,918 deaths due to asthma at the global level and accounts for 1% of all disability-adjusted life years (DALYS) attributable to Asthma in 2016. [2, 3]

Similarly chronic obstructive pulmonary disease (COPD) is other one of the leading global causes of morbidity and mortality, causing a considerable and increasing social and economic burden (GOLD, 2019). COPD claimed 3.0 million lives in 2016. [4]

Millions of patients with Asthma and COPD use inhalers every day.

Drug delivery by inhalation direcly targets lung and allows a distinct therapeutic advantage over systemic therapy with the use of smaller drug dose, a more rapid onset of therapeutic action and decreased side effects. Pressurized metered dose inhalers (pMDI) and dry powder inhalers (DPI) are most common inhaler devices prescribed and used by patients. The proper use of these devices in administering the drugs invariably has a direct relationship with the delivery and efficacy of the medications and clinical outcome. Global Initiative for Chronic Obstructive Lung Disease (GOLD) and Global Initiative for Asthma (GINA) in the recent global position document highlight the importance of assessing and correcting poor inhalation technique [5, 6]. Poor inhaler technique is increasingly being recognized societal and health-economic burden. Incorrect use of pMDIs and DPI for inhaled corticosteroids (ICS) has been associated with increased reliever use, worsening asthma and COPD and increased use of emergency medical services.[7] Correct inhaler use is crucial for the effectiveness

of therapy ,Usmani et al., 2018.[8] Several studies have shown that poor use of inhalers by patients is very common.

II. Aim and Objectives.

Aim of study was to evaluate inhaler techniques among patients with asthma and COPD as per standard steps.

III. Study setting

Subject and Sample size: This cross section observation study was carried out in Family Medicine OPD, Hatta Hospital from June – December 2019 .The study included 150 patients with asthma and COPD.

Inclusion Criteria; Patients with age 18 years and above who met with Diagnosis of Asthma according to GINA [9] and COPD according to GOLD [10] and were using inhaler for > one month.

Exclusion criteria were use of inhaler less than one month, acute exacerbation, those who received help and assistance from third person for the use of inhaler and patient not willing for demonstration of their inhaler technique.

IV. Data collection and assessment.

All 150 patients with Asthma and COPD were asked to use their inhaler. The technique was assessed using steps checklist through direct observation by a Family Physician. Data collected on demographics (Age, Sex), Smoking status, type of inhaler and errors in technique. Technique was considered wrong and improper when one or more mistakes were observed.

The study proposal was approved by the Clinical Governance office, Heath Regulation Department DHA.

Steps check list for MDI inhalers

1. Remove the Inhaler cap (mouth piece)
2. Shake the Inhaler
3. Breath out /exhale fully or maximum
4. Put the Inhaler mouth piece between lips and teeth
5. Press canister and trigger the inhaler while breathing in
6. Continue breath in deeply to maximum
7. Hold your breath for 10 seconds
8. Breath out slowly

Steps check list for DPI, *The Diskus*

1. Open the device
2. Slide the lever away until it stops / clicks
3. Exhale most, away from the mouthpiece.
4. Put the mouth piece between teeth and close lips around
5. Breath in deeply and strongly
6. Hold the breath for 10 s.
7. Removes the inhaler and Breathe out slowly.

Steps Check list for *Turbo haler*

1. Remove the cap and hold the Turbohaler upright
2. Twist the grip at base and around then back until it clicks
3. Exhale
4. Put mouth piece between teeth and close lips
5. Breath in strongly and deeply
6. Holds the breath for 10 s
7. Breath out slowly

V. Results

All 150 patients had their inhalation techniques evaluated, and patients who used a second inhalation device, different from primary one, were also evaluated as to inhalation techniques of the second inhalation device

Following Inhalers were in use and evaluated

PMDI- Ventoline Evohaler (gsk), Flutiform (mundi pharma), Foster (Chiesi) and Flixotide Evohaler (gsk)

DPI- Diskus; Seretide *Diskus* (gsk). Turbuhaler; Symbicort (AstraZeneca) and Pulmicort (AstraZeneca)

In this study, all our 150 patients were found using MDI either as reliever (majority) and or one as preventer/ controller (ICS).

Baseline Characteristics of patients with Asthma and COPD (Table-1)

Patient demographics -	Asthma (n- 113)	COPD (n-37)
Total 150	113 (75.3%)	37 (24.7%)
Age (years) – Minimum 18	18	38
Maximum 79	76	79
Mean (SD) 48.7 (-+16.5)	45 (+-16.9)	59.5 (-+ 12.3)
Gender- Male 64 (42.6%)	39 (34.5%)	25 (67.6%)
Female 86 (57.4%)	74 (65.5%)	12 (32.4%)
Smoking status – n (%)	n- 113	n- 37
• Never smoked 112 (74.7%)	94 (83.2%)	18 (48.7%)
• Ex-smoker 11 (7.3%)	5 (4.4%)	6 (16.2%)
• Smoker 27 (18%)	14 (12.4%)	13(35.1%)

Steps check for Inhalers pMDI, *Diskus* and Turbo haler (Table 2)

Category	n- Correct technique	Percent
Steps check for MDI inhaler user	n-150	
1. Remove the Inhaler cap (mouth piece)	150	100%
2. Shake the Inhaler	127	84.6%
3. Breath out fully	99	66%
4. Put the Inhaler mouth piece between lips and teeth	135	90%
5. Press canister and trigger the inhaler while breathing in	86	57.3%
6. Continue breath in deeply to maximum	75	50%
7. Hold your breath for 10seconds	87	58%
8. Breath out slowly	97	64.6%
Steps check for DPI , the *Diskus* inhaler user ,	n-74	
1. Open the device	72	97.3%
2. slide the lever away until it clicks/stops	53	71.6%
3. Exhale most away from mouth	52	70.2%
4. Put the mouth piece between teeth and closes lips around	71	96%
5. Breath in deeply and strongly	58	78.3%
6. Hold the breath for 10 seconds	48	65.5%
7. Breath out slowly	67	90%
Steps check for Turbo haler user,	n-58	
1.Remove the cap and hold the Turbohaler upright	53	91.3%
2. Twist the grip around at base then back until it click	31	53.4%
3. Exhale	34	58.6%
4. Put mouth piece between teeth and closes lips	58	100%
5. Breath in deeply and strongly	54	93%
6. Hold the breath for 10 seconds	23	39.6%
7. Breath out slowly	33	57%

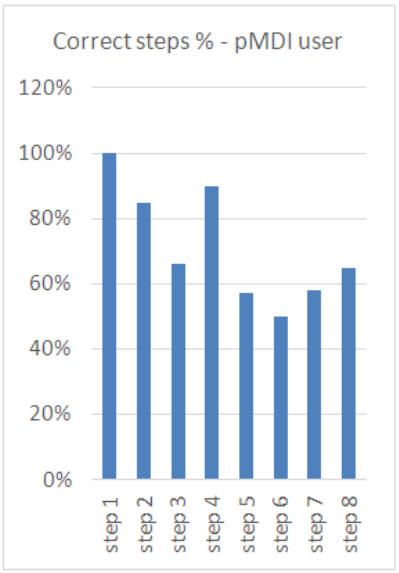

Fig-1

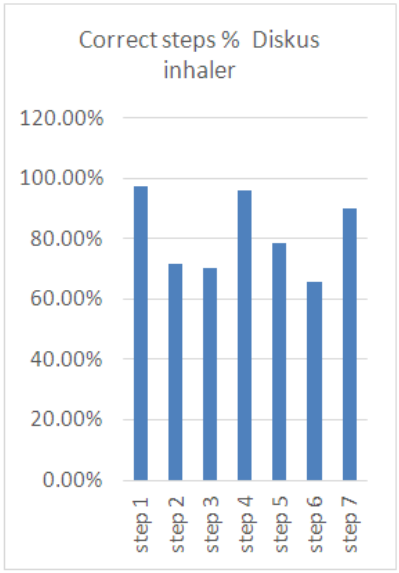

Fig-2

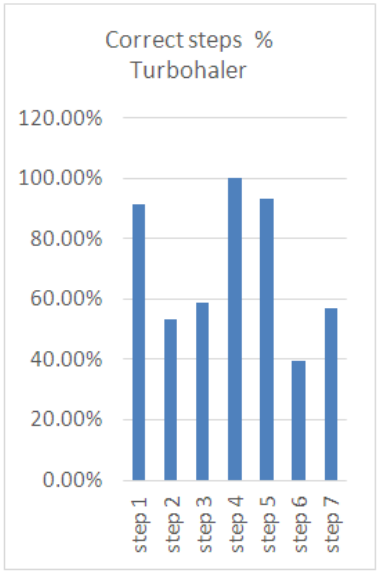

Fig-3

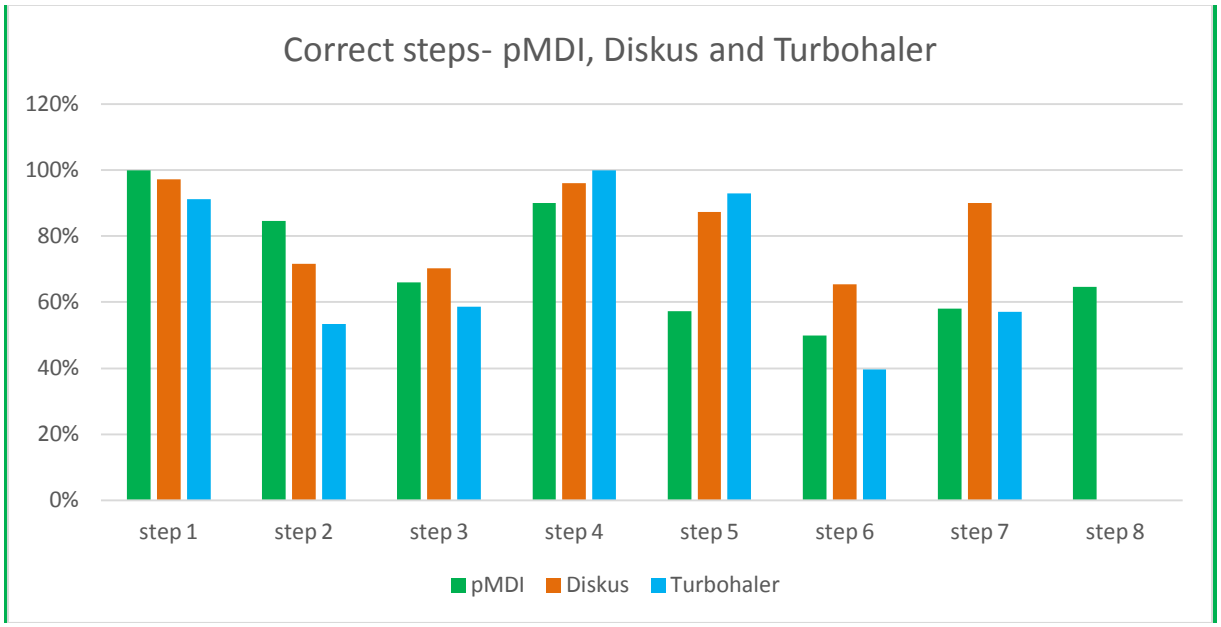

Fig-4

VI. Discussion.

Drug taken through inhalation by inhaler devices is an important and a common mode of administration in the management of Asthma and COPD. Studies showed almost up to 90% of Asthma patients demonstrate inhaler technique incorrectly.[11] A systematic review of assessment of inhaler use over the past 40 years concluded that only 31% of patients with COPD or asthma used their inhalers correctly, Sanchis, Gich, & Pedersen et al 2016.[12]

Our observational study of 150 patients' findings revealed that mistakes in inhaler techniques were frequent among both asthma and COPD patients whether it is MDI or DPI inhaler. DPI device users made fewer mistakes than the pMDI users during inhalation demonstration. The most common errors in the pMDI inhaler users in the study were step 6 (Continue to breath in deeply 50%), followed by step 5 (Press canister and Trigger the inhaler while breathing in deeply correct 86 subjects 57.3%) Fig-1.In DPI -Diskus inhaler users the most common error was step 6 ,having short breadth hold- less < 10 s- 48/74(65.5% correct) while second most common error was step 3, not exhaling before inhaling 52/74 correct (70%) Fig-2. In Turbohaler users most common error was also step 6, short breath hold 23/58 (39.6% correct) followed by error in step 2(Twist the grip around at base then back until it click (53.4% correct) and step 7 (Breath out slowly 57%) Fig3. At general

look about figures steps correctly done, it over 50% for each so much so its 100% correct first step pMDI users and over 70% for other steps for different inhalers. But when it comes to overall , in this study only 27.3% of pMDI (n-41/150), 35.1% of DPI-Diskus (n-26/74) and 32.7% of Turbohaler users (n-19/58) completed all the steps.

Our study findings can be correlated with the study by Onyedum and Desalu O et al [13] at university teaching hospital, UNTH and UNIH, Nigeria where 22.1% pMDI user completed all required steps while 37.3% did so for DPI [10]. In other study in Netherland by van Beerendonk *et al* [14], only 11.1% patients completed the required steps. In another study by Adeyeye and Onadeko,[15] at Lagos state University teaching Hospital,Lagos Nigeria ,32% of 106 Asthmatic patients performed all the steps of inhalation technique.

VII. Conclusion

Daily asthma symptoms and COPD persistent symptoms many a times results from ineffective drug delivery due to a poor inhaler technique since this would result in an ineffective drug delivery. Correct inhaler use is crucial for the effectiveness of therapy .Our Study showed that majority of the patients with Asthma and COPD at family medicine clinic committed errors in their inhaler use technique. Patients should be educated regarding correct inhaler technique upon prescribing and dispensing the Inhaler medications. The prescribing Physicians, Primary Care Family Physicians undoubtedly bear the primary responsibility for this task. However, other clinicians, nurses, Pharmacists and other health-care providers should be conversant with the correct sequence of inhaler use and patients should have their inhaler technique routinely checked and rechecked during each visit and if found faulty, technique should be rectified on proper inhaler technique steps.

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