

Assessment of Inhalation Techniques in COPD and Asthma Patients using Metered Dose Inhaler and Rota-haler

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ABSTRACT

Background: Inhaler dosage forms are cornerstone therapy in respiratory disease. Inhalers are principle vehicles for effective administration of medication. The effectiveness of inhalation drugs can affect by factors including age, gender, education status, duration of disease, type of inhaler used and correct inhalation technique. **Objectives:** To assess Inhalation Technique in the patients of COPD and Asthma using MDI and Rota-haler. Study prescribing trend of patient of COPD and Asthma. **Methods:** A prospective, interventional study conducted in Medical Outpatient Department of Sheth HJ Mahagujarat Hospital, Nadiad. Patients were diagnosed with asthma and COPD using MDI and Rota-haler inhalers. Total 60 patients were included in the study; Patients' history was recorded and after explanation of procedure for inhalers; assessments of inhalation technique were evaluated in inhaler specific checklist described by Dutch Asthma Foundation. **Results:** Total 53.39% (Asthma) and 58.35% (COPD) users used inhaler incorrectly. In Asthma MDI; it shows clinical significance but statistically non-significant ($p=0.10$) and Rota-haler; shows both clinical and statistical significance ($p=0.01$). In COPD MDI ($p=0.02$) and Rota-haler (0.04); shows both clinical and statistical significance ($p=0.02$). It shows improvement in patients' performance after providing information on use of inhaler. The most commonly prescribed drugs with MDI and Rota-haler were Short acting β -agonist, Corticosteroids and Combination of Bronchodilator and Corticosteroids. **Conclusion:** Majority of patients in Asthma (53.39%) and COPD (58.35%) used inhaler incorrectly which leads to decrease in efficacy and drug delivery, increased side effects and economic burden with non-compliance. Post-Intervention use on inhalation technique showed improvement.

Key words: Chronic Obstructive Pulmonary Disease, Asthma, Metered Dose Inhaler, Dutch Asthma Foundation, Rota-haler.

INTRODUCTION

COPD is common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and alveolar abnormalities, usually caused by significant exposure to noxious particles or gases.¹ Asthma is a chronic disease characterized by recurrent attacks of breathlessness and wheezing, which may vary in severity and frequency from person to person. Inhaler dosage forms are the cornerstone of therapy in respiratory disease. Inhalers are the principle vehicles for the effective administration of medication. The effectiveness of drugs for inhalation can be influenced by many factors including age,

gender, education status, duration of disease, type of inhaler used, correct inhalation technique and use of several inhalers.^{2,3}

There are three main categories of inhalers are available pressurized Metered Dose Inhalers (pMDIs), Dry Powder Inhalers (DPIs) and Small Volume Nebulizers (SVNs). DPIs and pMDIs are the devices most commonly used for drug delivery in the treatment of Asthma and COPD. Incorrect usage of inhalers is a significant problem for both Asthma and COPD management because it may result in reduced therapeutic effects, resulting in poor control of symptoms.⁴ Some research finding focus

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on assessment of inhaler technique checklist which has been shown to be feasible tools for assessment of correct admission techniques of various inhalers. The Dutch asthma foundation inhalation checklist study finding provide tools for the inhalation technique for the evaluating the correct inhalation technique. The tool was used for the inhalation technique is validated and reliable.

Moreover, a systematic review of the effectiveness of different inhaler devices in Asthma and COPD noted problems in comparisons between studies because of variation in the relevant inhaler technique checklists. The present study was targeted to evaluate the problems related to inhalation techniques and planned to carry out to educate/trained patients with Asthma / COPD using inhaler device. The finding will provide a baseline data to identify major problems at the patients' level to use device. Correct use of the device will give better treatment outcome and proper control of disease.

MATERIALS AND METHODS

Study Design: A prospective, interventional study was conducted at Medical Outpatient Department of Sheth H.J Mahagujarat Hospital in Nadiad, Gujarat, India. Prior permission was obtained from Institutional Ethics Committee of Ramanbhai Patel College of Pharmacy, CHARUSAT. Protocol Number: RPCP/IECHR/1/2018-2019/PG/R-03.01.

Study Population

Source of Subjects: The study was carried out in the Medical Outpatient Department of the Sheth H. J. Mahagujarat Hospital, Nadiad, Gujarat, India.

Inclusion Criteria: The study was conducted on both gender and all age group of patients and those patients who were diagnosed with COPD or Asthma and patient using Metered Dose Inhalers and/or Rota-halers and those who are already using MDI or Rota-halers more than 1 week.

Exclusion Criteria: Severe Exacerbation patients or not able to explain the technique of device used by patients.

Sample Size: A Total 60 patients out of this 30 Asthma and 30 COPD patients data was collected in the Case Record Form attending in Medical Outpatient Department of the hospital.

Study Duration: The study duration was 6 months. (June to December 2018).

Data Collection Method: Data was collected after visiting in the Medical outpatient department of the hospital and relevant information regarding patient history, initials, education related to inhalation technique was collected in the Case Record Form after interaction with patient. We just ask patient regarding the technique use of the device. For the inhalation technique after interacting with the patient; data was collected in the checklist given by the Dutch Asthma Foundation. An error was recorded in inhaler specific checklists. The score was derived by dividing the number of items correctly completed by the total number of items on the checklist and the result was expressed as a percentage. (Figure 1)

Statistical Analysis: Descriptive Statistics was used to generate results. Data analysis was analyzed using Microsoft Office excel using Paired *t*-test. The *p* value (< 0.05) was considered significant.

RESULTS

The Demographic details of both the patients; the mean age of the patients was 63 years (Asthma) and 64 years (COPD) respectively. Male to Female ratio was equal in case Asthma, while in COPD, male were predominate as depicted in Figure 2. The smoking history was commonly present in COPD patient (63%). Moreover, Male patients were higher in COPD. In both disease majority patients was secondary ($n=13$) education followed by primary ($n=10$), graduated ($n=7$) and uneducated ($n=3$) (Figure 3 and 4). Associated co-morbidities were Hypertension (37%) in Asthma while Hypertension (44%) was common in COPD; followed by Diabetes Mellitus-II (7% and 13%) in Asthma and COPD respectively. In both diseases Rota-

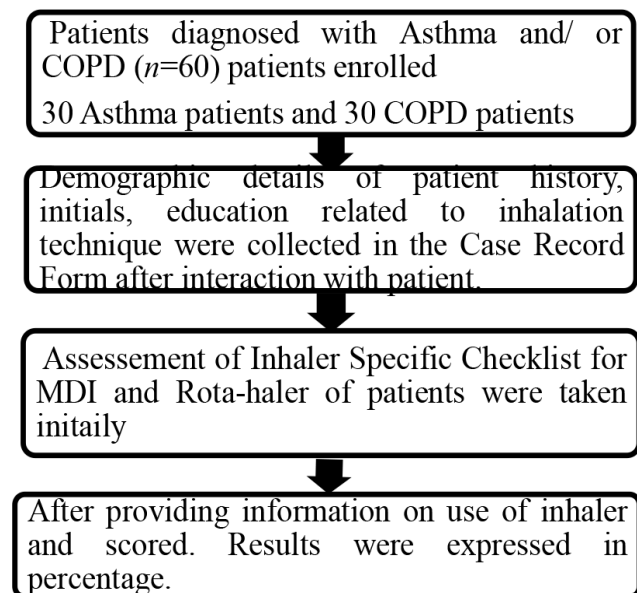


Figure 1: Patients Recruitment Process.

haler is prescribed more than MDI. In both disease most of the patients (41%) have experienced with device use mostly more than 1-3 weeks as represented in Table 1. The most common prescribed drugs with MDI and Rota-haler were Short acting β -agonist (24%), Corticosteroids (28%) and combination of Bronchodilator and Corticosteroids (15%). (Figure 5 and 6)

For the assessment of inhalation technique Dutch Asthma Foundation Inhaler specific checklist was used. For Asthma; inhalation technique in MDI ($n=13$) patients were assessed, mentioned in Table 2 shows common errors and correctly performed step. There was non-significant change ($p=0.10$) before and after providing information about MDI Inhaler. While another Rota-haler ($n=17$) patients were assessed, mentioned Table 3 shows common errors and correctly performed step. There was significant ($p=0.01$) improvement in Rota-haler inhaler use after providing educating patient.

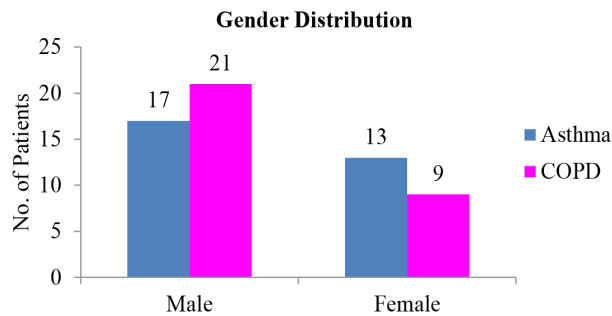


Figure 2: Gender Distribution of Asthma and COPD.

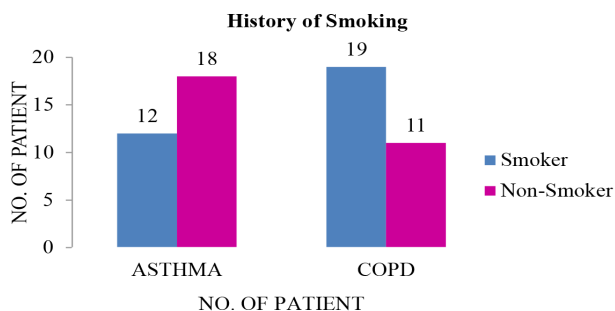


Figure 3: History of Smoking.

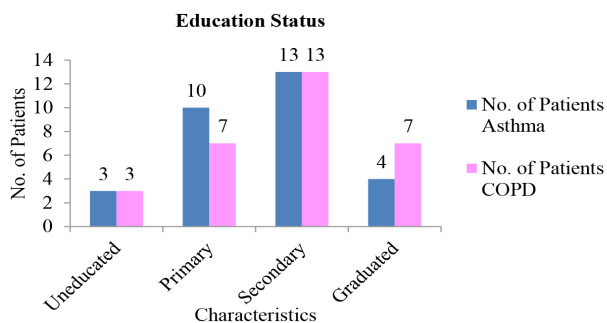


Figure 4: Education Status.

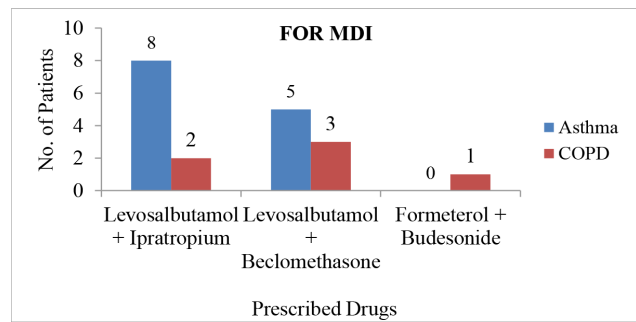


Figure 5: Prescribed drug for MDI (Asthma and COPD).

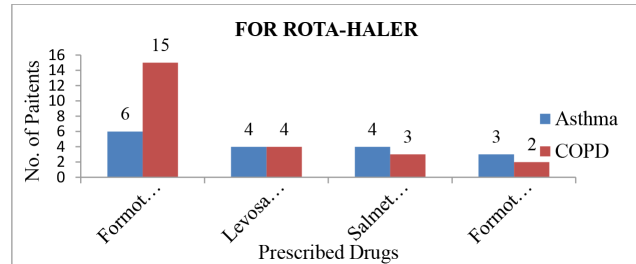


Figure 6: Prescribed Drugs for Rota-haler (Asthma and COPD).

Table 1: Demographic Details.

1. Age Wise Distribution		
Age	No. of Patient	
	Asthma	COPD
Below 40 yrs.	1	0
41-50	6	5
51-60	7	8
61-70	7	9
71-80	8	6
81-90	1	2
2. History of Smoking		
Smoker	12	19
Non-Smoker	18	11
3. Education Status		
Uneducated	3	3
Primary	10	7
Secondary	13	13
Graduated	4	7
4. Associated Co-morbidities		
Hypertension	11	13
Ischemic Heart Disease	1	0
Diabetes Mellitus-II	2	4
No Co-morbidities	16	13
5. Gender Distribution		
Male	17	21
Female	13	9
6. Device used		
MDI	13	6
Rota-haler	17	24
Total	30	30

Table 2: Inhaler Specific Checklist with Item Score for Asthma Patients (MDI).

Item No.	MDI (13)	Item score (n, %) (PRE)	Item score (n, %) (POST)	Paired t-test (P value)
1	Remove cap and shake the inhaler	13(100)	13(100)	0.10*
2	Hold inhaler upright	7(53.84)	10(76.92)	
3	Exhale to residual volume	10(76.92)	12(92.30)	
4	Keep head upright or slightly tilted	9(69.23)	11(84.61)	
5	Mouth piece between teeth and lips	11(84.61)	13(100)	
6	Inhale slowly and press canister	9(69.23)	13(100)	
7	Continue slow and deep inhalation	11(84.61)	12(92.30)	
8	Hold breath for 5sec	5(38.46)	7(53.84)	

* Non-Significant

Table 4: Inhaler Specific Checklist with Item Score for COPD Patients (MDI).

Item No.	MDI (6)	Item score (n, %) (PRE)	Item score (n, %) (POST)	Paired t-test (P value)
1	Remove cap and shake the inhaler	6(100)	6(100)	0.02*
2	Hold inhaler upright	4(66.67)	6(100)	
3	Exhale to residual volume	4(66.67)	6(100)	
4	Keep head upright or slightly tilted	3(50)	4(66.67)	
5	Mouthpiece between teeth and lips	6(100)	6(100)	
6	Inhale slowly and press canister	5(83.34)	6(100)	
7	Continue slow and deep inhalation	4(66.67)	6(100)	
8	Hold breath for 5sec	4(66.67)	5(83.34)	

* Significant

Table 3: Inhaler Specific Checklist with Item Score for Asthma Patients (Rota-haler).

Item No.	Rota-haler (17)	Item score (n, %) (PRE)	Item score (n, %) (POST)	Paired t-test (P value)
1	Keep the Rota-haler upright	15(88.23)	17(100)	0.01*
2	Insert Rota cap with transparent end Down	10(58.82)	16(94.11)	
3	Keep Rota-haler horizontal	12(70.58)	16(94.11)	
4	Rotate both ends to open capsule	13(76.47)	14(82.35)	
5	Exhale to residual volume	12(70.58)	15(88.23)	
6	Keep Rota-haler level and put mouthpiece between teeth and lips	12(70.58)	15(88.23)	
7	Inhale powder forcefully and deeply	13(76.47)	16(94.17)	
8	Remove Rota-haler from mouth and hold breath for 5 sec	7(41.17)	10(58.82)	
9	Exhale away from the mouthpiece	9(52.95)	14(82.35)	
10	If any powder is left, repeat steps from 1-9	7(41.17)	9(52.94)	
11	Open Rota-haler and discard the empty capsules	8(47.58)	10(58.82)	

* Significant

Table 5: Inhaler Specific Checklist with Item Score for COPD Patients (Rota-haler).

Item No.	Rota-haler (24)	Item score (n, %) (PRE)	Item score (n, %) (POST)	Paired t-test (P value)
1	Keep the Rota-haler upright	23(95.84)	24(100)	0.04*
2	Insert Rota cap with transparent end Down	15(62.5)	24(100)	
3	Keep Rota-haler horizontal	15(62.5)	22(91.67)	
4	Rotate both ends to open capsule	15(62.5)	24(100)	
5	Exhale to residual volume	19(79.17)	22(91.67)	
6	Keep Rota-haler level and put mouthpiece between teeth and lips	20(83.34)	23(95.84)	
7	Inhale powder forcefully and deeply	23(95.84)	24(100)	
8	Remove Rota-haler from mouth and hold breath for 5 sec	10(41.67)	16(66.67)	
9	Exhale away from the mouthpiece	20(83.34)	20(83.34)	
10	If any powder is left, repeat steps from 1-9	8(33.34)	12(50)	
11	Open Rota-haler and discard the empty capsules	11(45.83)	15(62.5)	

* Significant

For COPD; inhalation technique in MDI ($n=6$) patients were assessed, mentioned in Table 4 shows common errors and correctly performed step. There was significant ($p=0.02$) improvement in MDI inhaler use after providing educating patient. While another Rota-haler ($n=24$) patients were assessed, mentioned Table 5 shows common errors and correctly performed step. There was significant ($p=0.04$) improvement in Rota-haler inhaler use after providing educating patient.

DISCUSSION

A total 60 patients were enrolled out of which 30 patients of COPD and 30 patients of Asthma with experienced of inhaler (MDI/Rota-haler) were included. The mean age of the patients was 63 (Asthma) and 64 (COPD) years respectively. As age increases the prevalence of COPD gradually increased with the age.⁵ Similarly, results of Bhandari *et al.* showed COPD increased with age (60-69 years).⁶

The male to female ratio was equal in case of Asthma, while in case of COPD, male were predominate. The smoking history was commonly present in COPD patient (19, 63%).⁷ Similarly a study by, Mathew Joseph *et al.* study reveals that the majority of patients were males (67%) comparing with females (33%). This may be due to presence of smoking history among males than females.⁸ Likewise, Pun Sangita *et al.* study reveals that in COPD patients' history of smoking (36%).²

Education plays a role in understanding the inhalation technique. In our study, approx. 50 % patients were educated and had showed better understanding after instruction provided on correct use of inhaler. Similar, Mathew Joseph *et al.* study suggests that, most of the patients were educated to high school level (28%) followed by higher secondary (26%), degree (18%), primary (12%), post-graduation (10%) and only 6% of participants were illiterates.⁸

Present study showed that, Hypertension (37% and 44%) followed by Diabetes Mellitus-II (7% and 13%) as associated comorbidities with Asthma and COPD. Pun Sangita *et al.* study reveals that associated co-morbidities with COPD was cor-pulmonale (36%), followed by Diabetes mellitus (20%) and hypertension (9%).²

In our study, Rota-haler were most commonly prescribed device than MDI in Asthma (17) and COPD (24) patients. Rota-haler use has few benefits over other device used in Asthma or COPD like easy to handle, simple steps of inhaler, breath activated and do not require co-ordination

between actuation and inhalation, peak inspiratory flow rate to dispense powder 30-60 L/min, cheaper despite that certain disadvantage are cleaning problem of inhaler which cause microbial contamination, moisture sensitive, reload capsule each time; However, MDI is easy to handle, easy to used, site specific delivery of drugs and less systemic adverse drug reaction despite that, proper technique required, co-ordination with actuation and inhalation, costly, dosing errors, difficult to deliver high dose, slow deep inhalation and peak inspiratory flow rate less than 60 L/min are major concern. The most common errors while using MDI and Rota-haler were "Hold breath for 5 sec" and "Hold inhaler upright" and "Remove Rota-haler from mouth" and "Open Rota-haler and discard the empty capsules" respectively.⁹⁻¹³ Likewise other study Chauhan *et al.* study shows, problem associated with the use of MDI was proper technique is required for inhalation which leads to less delivery of drug at the site. Step of Hold breathe and activate aerosol were the most common errors.¹⁴

In our study, Asthma patients ($n=13$); inhalation technique in MDI patients were assessed before providing information on the use of inhaler; Pre-intervention correctly performed steps were "Remove cap and shake the inhaler" (13, 100%), "Mouthpiece between teeth and lips" and "Continue slow and deep inhalation" (11, 84.61%), "Exhale to residual volume" (10, 76.92%), "Keep head upright or slightly tilted" and "Inhale slowly and press canister" (9, 69.23%); Patients common errors were "Hold inhaler upright" (7, 53.84%), "Hold breath for 5 sec" (5, 38.46%). After providing information on use of inhaler; Patients correctly performed steps were "Remove cap and shake the inhaler", "Mouthpiece between teeth and lips" and "Inhale slowly and press canister" (13, 100%), "Exhale to residual volume", "Continue slow and deep inhalation" (12, 92.30%) and "Keep head upright or slightly tilted" (11, 84.61%); Patients common errors were "Hold breath for 5 sec" (7, 53.84%) and "Hold inhaler upright" (10, 76.92%). However, there was improvement in understanding of patients but non-significant change ($p=0.10$) in before and after providing information about MDI Inhaler.

In case of Asthma; 17 users were assessed for the correct use. Patients own knowledge about use of inhaler was evaluated before providing information on inhaler; Patients correctly perform steps were "Keep the Rota-haler upright" (15, 88.23%), "Rotate both ends to open capsule" and "Inhale powder forcefully and deeply" (13, 76.47%), "Keep Rota-haler horizontal", "Exhale to residual volume" and "Keep Rota-haler level and put mouthpiece between teeth and lips" (12, 70.58%) and "Insert Rota cap with transparent end Down"

(10, 58.82%); Patients common errors were found in following steps like, “Remove Rota-haler from mouth and hold breath for 5 sec” and “If any powder is left, repeat steps from 1-9” (7, 41.17%), “Open Rota-haler and discard the empty capsules” (8, 47.58%) and “Exhale away from the mouthpiece” (9, 52.95%). Similarly, after providing information on use of inhaler; Patients correctly perform steps were “Keep the Rota-haler upright” (17, 100%), “Insert Rota cap with transparent end down”, “Keep Rota-haler horizontal” and “Inhale powder forcefully and deeply” (16, 94.17%), “Exhale to residual volume” and “Keep Rota-haler level and put mouth Piece between teeth and lips” (15, 88.23%), “Rotate both ends to open capsule” and “Exhale away from the mouthpiece” (14, 82.35%); Patients common errors were “Remove Rota-haler from mouth and hold breath for 5 sec” and “Open Rota-haler and discard the empty capsules” (10, 58.82%), “If any powder is left, repeat steps from 1-9” (9, 52.94%). There was significant ($p=0.01$) improvement in Rota-Haler inhaler use after providing educating patient. A study by Sodhi MK *et al.* reported that, most of the Asthma patients ($n=140$) used their inhalers incorrectly; MDI (2.1%) and Rota-haler (37.3%) complete all steps in different technique.¹⁴ Intervention of Pharmacist on correct use of device had shown improvement in scoring in few critical steps.

In our study, COPD patients inhalation technique of MDI ($n=6$) were assessed before providing information on use of inhaler were “Remove cap and shake the inhaler” and “Mouthpiece between teeth and lips” (6, 100%), “Inhale slowly and press canister” (5, 83.34%); patients common errors were “Hold inhaler upright”, “Exhale to residual volume”, “Continue slow and deep inhalation” and “Hold breath for 5 sec” (4, 66.67%), “Keep head upright or slightly tilted” (3, 50%) performed correctly. Immediately after providing information on the use of inhaler; Patients correctly perform steps were improved. Such as “Remove cap and shake the inhaler”, “Hold inhaler upright”, “Exhale to residual volume”, “Mouthpiece between teeth and lips”, “Inhale slowly and press canister” and “Continue slow and deep inhalation” (6, 100%). Patient’s common errors were in “Keep head upright or slightly tilted” (4, 66.67%) and “Hold breath for 5 sec” (5, 83.34%). There was significant ($p=0.02$) improvement in MDI inhaler use after educating patient. Mukhtar Ansari *et al.* study suggested that 63.3% improvement after counseling and the test was significant at $P=0.000$ (<0.05)¹⁴ While comparison of mean scores of MDI inhaler before and after counseling.

In our study, COPD; Rota-haler was used by 24 patients and were assessed before providing information on the use of inhaler; Patients correctly performed steps were “Keep

the Rota-haler upright” and “Inhale powder forcefully and deeply” (23, 95.84%), “Keep Rota-haler level and put mouth Piece between teeth and lips” and “Exhale away from the mouthpiece” (20, 83.34%), “Exhale to residual volume” (19, 79.17%), “Insert Rota cap with transparent end Down”, “Keep Rota-haler horizontal” and “Rotate both ends to open capsule” (15, 62.5%); Patients common errors were “Remove Rota-haler from mouth and hold breath for 5 sec” (10, 41.67%), “If any powder is left, repeat steps from 1-9” (8, 33.34%) and “Open Rota-haler and discard the empty capsules” (11, 45.83%). Immediately after providing information on use of inhaler; Patients correctly perform steps were “Keep the Rota-haler upright”, “Insert Rota cap with transparent end down”, “Rotate both ends to open capsule” and “Inhale powder forcefully and deeply” (24, 100%), “Keep Rota-haler level and put mouth Piece between teeth and lips” (23, 95.84%), “Keep Rota-haler horizontal” and “Exhale to residual volume” (22, 91.67%), “Exhale away from the mouthpiece” (20, 83.34%); Patients common errors were “Remove Rota-haler from mouth and hold breath for 5 sec” (16, 66.67%), “If any powder is left, repeat steps from 1-9” (12, 50%) and “Open Rota-haler and discard the empty capsules” (15, 62.5%). There was significant ($p=0.04$) improvement in Rota-Haler inhaler use after educating patient. It also indicated that correct assistance by health care providers will benefit the patient in disease control and better prognosis. Palen *et al.* reported Patients common errors while using MDI and Rota-haler were “not exhaling to residual volume” and “not holding the breath for 5 sec”.¹ Another study by Mukhtar Ansari *et al.* study suggests that comparison of mean scores of Rota-haler inhaler before and after counseling showed 57.75% improvement after counseling and also significant improvement ($P=0.000$).¹⁵

In our study, the most commonly prescribed drugs for MDI in patients of Asthma were Corticosteroids (15%) i.e. Levosalbutamol + Ipratropium followed by Bronchodilator i.e. Acebrophylline + Doxophylline (15%), Bronchodilator i.e. Doxophylline (14%) Other medications were prescribed, such as Proton Pump Inhibitors (9%) i.e. Domperidone + Pantoprazole, ARBs + CCB (6%) i.e. Telmisartan + Amlodipine, Natural Anti Histamine + Leukotriene Receptor Antagonists (5%) i.e. Levocetirizine + Montelukast, Methyl xanthine (4%) i.e. Etophylline + Theophylline, Mucolytic Agent (4%) i.e. Acetylcysteine, Nitrates (2%) i.e. Nitroglycerin, SSRIs (2%) i.e. Clonazepam + Escitalopram Oxalate, Loop diuretic (1%) i.e. Torsamide, Nutrient Supplement (1%) i.e. Cynocobalamin + Ferrous Fumarate + Folic Acid, CCBs (1%) i.e. Clinidipine, Selective Beta 1 blocker (1%) i.e. Metoprolol Succinate and Antipyretic (1%) i.e.

Paracetamol. Associated conditions were also considered for management.

In our study, the most commonly prescribed drugs for Rota-haler in patients of Asthma were Bronchodilator + Corticosteroids (15%) i.e. Formoterol + Budesonide. Other medications were prescribed for the better control of associated conditions.

In our study, the most commonly prescribed drugs for MDI in patients of COPD were Corticosteroids (28%) i.e. Levosalbutamol + Beclomethasone, Bronchodilator (16%) i.e. Acebrophylline + Doxophylline and Antihistaminic + Antiallergics (20%) i.e. Diphenhydramine + Ammonium Chloride + Sodium Citrate. The most commonly prescribed drugs for Rota-haler in patients of COPD were Short Acting Beta Agonists (24%) i.e. Formoterol + Budesonide. It accounted for the better control of associated conditions. Similar study Pun Sangita *et al.* the most commonly prescribed drugs were short acting beta agonists (24%), anticholinergic (24%) and combination of Corticosteroids with Long acting beta agonists (20%).¹

In Our study, the pharmacist's role in healthcare is justified. Moreover, assessment on correct use of inhaler in patients before and after educating can improve efficacy of drug therapy. In conclusion, by Proper inhalation technique, it improves drug delivery into lungs and decrease disease progression.

Limitations and noteworthy drawback of the study was its small sample size, as predetermined study time is essential in academic project. Another, inhaler users were told to perform the inhalation technique under the supervision to identify correctness of use, so there was a possibility that they might had done it with error under the pressure of being observed and incorrect inhaler use has been found to be high in this study which is a major cause of concern.

CONCLUSION

Pharmacist interventions on inhalation technique improve patient's knowledge about disease and demonstrate difficult steps of inhaler. A study concluded that majority of patients in Asthma (53.39%) and COPD (58.35%) used inhaler incorrectly were to decrease in efficacy, insufficient drug delivery, increased side effects and economic burden with non-compliance. Post-Intervention on inhalation technique there was improvement in inhalation technique. The mean age of the patients was 63 years (Asthma) and 64 years (COPD). Male to female ratio was equal in Asthma, while in COPD, male patients predominate. Smoking history was

commonly observed in COPD patient. Hypertension was the most associated co-morbidity in both Asthma and COPD. Rota-haler was mostly used than MDI because of less errors and better outcome. The most common drugs prescribed with MDI and Rota-haler were Short acting β -agonist, Corticosteroids and Combination of Bronchodilator and Corticosteroids.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

COPD: Chronic Obstructive Pulmonary Disease; **pMDI:** Pressurized Metered Dose Inhaler; **DPI:** Dry Powder Inhaler; **SVN:** Small Volume Nebulizer; **MDI:** Metered Dose Inhaler; **ACEs:** Angiotensin Converting Enzyme; **NSAIDs:** Non-Steroidal Anti-inflammatory Drugs; **ARBs:** Angiotensin Receptor Blockers; **CCBs:** Calcium Channel Blockers; **SSRIs:** Selective Serotonin Reuptake Blockers; **PPIs:** Proton Pump Inhibitors.

SUMMARY

A prospective, interventional study was carried out at Sheth HJ Mahagujarat Hospital, Nadiad for a period of six months from June to December 2018. The study initiated after the approval from Ethics Committee of Ramanbhai Patel College of Pharmacy, CHARUSAT, Changa. All the Asthma or COPD patients and using MDI or Rota-haler for a period of more than 1 week and attended at outpatient department during the study period was included in the study. Data were collected only after obtaining their informed consent and the records of the data was done in predesigned case record form which includes all the information of patients such as Demographic Details, Presenting Complains, Co-Morbidity, Past History and Inhalation Specific Checklist for both inhalers (MDI and Rota-haler).

Total 60 patients were included out of this 30 Asthma and 30 COPD patients were collected. The mean age of the patients was 63 years (Asthma) and 64 years (COPD) respectively. Male to female ratio was equal in case Asthma, while in case of COPD, male patients predominate. The etiological factor, smoking history was commonly present in COPD patient (19, 63%). Moreover, male patients were higher in COPD. This

could be the reason for disease development. While in asthma history of non-smoking were common. In education status, total patients (43%) had secondary education in asthma while 44% patients in COPD had secondary education. Hypertension was most common associated co-morbidity in Asthma (37%) and COPD (44%). Most commonly prescribed inhaler among MDI and Rota-haler were Rota-halers. As it was prescribed in both the disease condition and patients has experienced mostly 1-3 weeks. The most common prescribed drugs with MDI and Rota-haler were Short acting β -agonist (24%), Corticosteroids (28%) and combination of Bronchodilator and Corticosteroids (15%).

For Asthma patients ($n=13$) in MDI; it showed improvement in patients performance on use of inhaler, it shows clinical significance but statistically non-significant ($p=0.10$); another device Rota-haler ($n=17$) patients shows improvement on use of inhaler, it shows clinical as well as statistical significance ($p=0.01$). For COPD patients ($n=6$) in MDI; it shows improvement in patients performance on use of inhaler, along with it shows clinical as well as statistical significance ($p=0.02$); while another device Rota-haler ($n=24$) patients shows improvement on use of inhaler, both clinical as well as statistical significance ($p=0.04$).

REFERENCES

1. Sangita P, Prasad GK, Laxman B. An overview on symptoms causes test treatment for chronic obstructive pulmonary disease. *International Research Journal of Pharmacy*. 2012;3(1):69-76.
2. Vander PJ, Klein JJ, Kerckhoff AH, VanHerwaarden CL. Evaluation of the effectiveness of four different inhalers in patients with chronic obstructive pulmonary disease. *Thorax*. 1995;50(11):1183-7.
3. Lavorini F, Magnan A, Dubus JC, Voshaar T, Corbetta L, Broeders M, et al. Effect of incorrect use of dry powder inhalers on management of patients with asthma and COPD. *Respiratory Medicine*. 2008;102(4):593-604.
4. Crompton G. A brief history of inhaled asthma therapy over the last fifty years. *Primary Care Respiratory Journal*. 2006;15(6):326.
5. Goren A, Noviski N, Avital A, Maayan C, Stahl E, Godfrey S, et al. Assessment of the ability of young children to use a powder inhaler device (Turbohaler). *Pediatric Pulmonology*. 1994;18(2):77-80.
6. Bhandari R, Sharma R. Epidemiology of chronic obstructive pulmonary disease: A descriptive study in the mid-western region of Nepal. *International Journal of Chronic Obstructive Pulmonary Disease*. 2012;7:253-70.
7. Basheti IA, Bosnic-Anticevich SZ, Armour CL, Reddel HK. Checklists for powder inhaler technique: A review and recommendations. *Respiratory Care*. 2014;59(7):1140-54.
8. Quint JK, Baghai-Ravary R, Donaldson GC, Wedzicha JA. Relationship between depression and exacerbations in COPD. *European Respiratory Journal*. 2008;32(1):53-60.
9. Anson MJ, Jelitt IT, Niranjana S, Amrith V, Shaji SCD. A Prospective Study on Assessment of Prevalence of Depression and Impact of Patient Counseling on Knowledge, Attitude and Practice of Patients with COPD in A Multispecialty Tertiary Care Hospital. 2017;47(2):97-101.
10. Ansari M, Rao BS, Koju R, Shakya R. Impact of pharmaceutical intervention on inhalation technique. *Kathmandu University Journal of Science, Engineering and Technology*. 2005;1(1):1-8.
11. Mandeep KS. Incorrect inhaler techniques in Western India: Still a common problem. *International Journal of Research in Medical Sciences*. 2017;5(8):3461-5.
12. Sehajpal R, Koolwal A, Koolwal S. Assessment of inhalation technique of bronchial asthma and chronic obstructive pulmonary disease patients attending tertiary care hospital in Jaipur, Rajasthan. *Indian Journal of Allergy, Asthma and Immunology*. 2014;28(2):78.
13. Rootmensen GN, VanKeimpema AR, Jansen HM, DeHaan RJ. Predictors of incorrect inhalation technique in patients with asthma or COPD: A study using a validated videotaped scoring method. *Journal of Aerosol Medicine and Pulmonary Drug Delivery*. 2010;23(5):323-8.
14. Chauhan A, Patel P, Gandhi A, Desai M. An evaluation of Metered-Dose inhaler administration technique in patients of asthma and chronic obstructive pulmonary disease. *Journal of Applied Pharmaceutical Science*. 2016;6:115-8.
15. Ocakli B, Ozmen I, Tunçay EA, Gungor S, Altinoz H, Adiguzel N, et al. A comparative analysis of errors in inhaler technique among COPD versus asthma patients. *International Journal of Chronic Obstructive Pulmonary Disease*. 2018;13:2941-5.