

ASSESSMENT OF TECHNIQUE OF INHALER USAGE IN FOLLOW-UP PATIENTS OF ASTHMA AND COPD ATTENDING THE TERTIARY CARE HOSPITAL IN NORTH KARNATAKA, INDIA -AN EDUCATIONAL INTERVENTION STUDY.

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ABSTRACT

*The chronic respiratory diseases like Asthma and Chronic Obstructive Pulmonary Diseases are increasing all over the world. Inhalation therapy is the most endorsed and effective therapy for these, but improper inhalation technique can cause poor disease control and increase the burden on health care resources. **Objective:** this project was undertaken to assess the steps followed in the inhalation technique by patients and to determine the effect of a single intervention by clinician to improve the knowledge and practise of patient regarding the use of inhalers among follow up patients of asthma and Chronic Obstructive Pulmonary Disease (COPD). **Material and Methodology:** A total of 85 patients with asthma or COPD using inhaler medication were enrolled for the study. The patients were interviewed and their inhalation technique was observed and assessed using checklists. Faults were noted and counselling with hands-on demonstration of proper inhalation technique was given. After 2 days, patients were called for follow up and their inhalation technique was re-evaluated using the same checklist. Pre and post evaluation was done to assess the impact of education on inhalation technique among asthma and COPD patients. **Results:** Majority of the patients committed at least 4 errors in their inhalation technique in the pre education session. There was a significant fall in the number of patients who committing errors from the pre to post test. Out of 85 patients, 85.9% committed error in the step of cleaning the spacer and proper storage. This number dropped to 11.8% after counselling with demonstration ($P < 0.015$). **Conclusion:** Proper inhalational technique is needed for effective drug delivery in COPD and asthma patients. The overall inhalation technique in asthma and COPD patients is poor. Prescribing Doctor, nurse and pharmacists can play a key role in improving health outcomes of patients with asthma and COPD by providing knowledge on how to use their inhaler devices properly.*

KEYWORDS: Asthma and Chronic Obstructive Pulmonary Diseases are increasing

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INTRODUCTION

In the era of COVID 19, where nebulization without a separate room or a negative pressure room is problematic as it leads to production of lot of aerosols, it is important for the Asthmatic and COPD patients to correctly follow the steps of pressurized metered dose inhaler (pMDI) with a spacer since it is a minimal aerosol generating alternative to nebulization.

Chronic Respiratory Diseases (CRDs) are diseases of the airways and other structures of the lungs. Some of the most common are chronic obstructive pulmonary disease (COPD) and asthma. A World Health Organisation (WHO) report tells that around 235 million people suffer from asthma worldwide, more than 90% of deaths due to COPD occur in low and middle income countries and it is an estimated 6% of all deaths worldwide(1). In India, it

accounts for an estimated burden of about 100 million individuals. The prevalence of COPD and asthma are increasing day by day in India and epidemiological data available on them is minimal. The available data shows that disease control in many countries, including India is poor(2). Proper disease control is a joint outcome of appropriate medication with monitoring of disease progression, modification of treatment and proper usage of inhalational technique. Of late, inhalation therapy has become the backbone in the treatment of these disorders(3). Inhaled bronchodilators and steroids are mandatory for the treatment of COPD and asthma because of their ability to ease the symptoms, improve airflow, decrease the exacerbation and improve the quality of life(4). A systematic review of studies observing patients' inhaler technique reported an overall prevalence of 31% of poor technique, 41% acceptable technique, and 31% correct usage in patients with asthma or COPD(3,5). Lack of knowledge in inhalation technique is a major reason for treatment failure.

Hence, our study evaluates the inhalation technique in COPD and Asthma patients using pressurized metered dose inhalers (pMDI) attending a tertiary care hospital for respiratory diseases in North Karnataka and gives them educational intervention regarding proper technique.

OBJECTIVES

To assess the steps followed in the inhalation technique by patients and to determine the effect of a single intervention by clinician to improve the knowledge of patient regarding the use of inhalers among follow up patients of asthma and Chronic Obstructive Pulmonary Disease (COPD).

MATERIALS AND METHODOLOGY

It was an Educational Interventional Study, providing educational intervention regarding correct use of inhalers to the follow-up patients.

All the follow up Asthma and COPD patients attending OPD of Department of Respiratory Medicine/ Pulmonary Medicine of a teaching institute in North Karnataka were taken in the study. The study was conducted between 1st August 2019 and 30th December 2019 (three months) in BLDE (DU) Shri B M Patil Medical College, Vijayapura, Karnataka, India.

Taking 95% as the inadequacy in inhaler usage¹, we calculated our sample size. Sample size is calculated using the formula, $n = \frac{4 \times p \times q}{l^2}$, where p is 95% inadequacy rate, q= (100-p), and l is absolute error of 5%. Taking confidence interval of 95%, we got our sample size as 76 and taking nonresponse rate as 10%, the final sample size is 84 follow-up patients.

Inclusion criteria: All the patients using pMDI for either COPD or Asthma visiting OPD for follow up and who gave informed consent for the study, were included in the study.

Exclusion criteria: Those who did not give consent.

Ethical issues: Permission from the Institutional Ethical Committee was taken for the study.

Study Method:

All the follow-up Patients who gave consent for the study were included in the study and their basic demographic data like age, gender, address, history of disease, were collected, using a validated questionnaire and inhalation check list form developed by Hammerlein A(5,6) were used to assess the inhalation technique. We assessed the patients' inhaler usage technique before intervention by interviewing and observing the patient, while they were using the inhaler, with the help of checklist. After that, counselling was provided to the patients by practical demonstration on proper inhalation technique. To

determine the impact of intervention, we again assessed the patient’s inhaler usage by observation after 2 days of intervention.

Our checklist included following items,

S. No.	Steps	Importance
1	Shaking the Inhalers	Helps drug and HFA propellant to mix properly
2	Uncapping the Inhaler	Proper fit of pMDI and spacer to prevent leaks.
3	Fixing properly to spacer	
4	Hold the inhaler upright	
5	Exhale completely	Such that the Inhaled drug reaches deeper airways while inhalation.
6	Place the space mouthpiece between teeth	To prevent leak of drug.
7	Close the lips around mouthpiece to create proper seal.	
8	Trigger the pMDI	Inhaled drug is discharged properly.
9	Simultaneously inhaling deeply and slowly	Maximum possible drug deposition.
10	Continue to inhale until lungs are full	
11	Hold the breath for 10 seconds	Use of gravity to help in drug settling in airways.
12	Breathing out through nose	Help in controlling concomitant upper airway allergy.
13	Recapping the device and spacer	To keep devices clean and hygienic.
14	Cleaning the spacer and storage	
15	Rinsing the mouth with water	To remove excess drug deposition in oral cavity and associated side effects.

Statistical Analysis: The data was tabulated in Microsoft Excel sheet and analysed using SPSS software Ver. 16 (SPSS South Asia Pvt. Ltd., Bengaluru, Karnataka, India). The data is expressed in tabular form as frequency and percentage, graphical and statistical test Chi Square is applied to check for statistical significance.

RESULTS

Out of 85 follow up patients 55.3% were male and maximum of 42.4% were in the age group of 51-65yrs. In our study patients diagnosed with Asthma were 40% and COPD were 60%. But, almost 50% of them had duration of illness of only less than 5yrs.

Among 85 patients, only 15 were taught the usage of inhaler for the first time by doctor, of the remaining, 44 were taught by technician / nursing staff and 26 by pharmacist. Fig 2 shows that highest percentage of error before educational intervention was made by patients who were taught the usage of inhaler by pharmacist. Fig 3 show the improvement in the usage of inhaler by the patients, it depicts that educational intervention in the form of demonstration helped the patients in correcting the steps. When we compared the error in steps of inhaler usage technique performed by patients before and after educational intervention, we found that there was reduction in the error in all the steps and many of them were statistically significant (Table 02).

DISCUSSIONS

The inhaled medications for Asthma and COPD administered through inhaler devices and their success in clinical practice can be affected by many factors like proper technique, education level of the patients, time of prescribing doctor for educating patients and their compliance, which help in more drug deposition in the airways and lungs. The amount of drug reaching the target organ is important for improved efficacy in the treatment of asthma. This in turn depends on the type of inhaler device, technique of inhalation, and patient’s compliance to inhalers.(7)

Our study depicts that most of the patients are not well educated regarding the proper method of usage of inhalers, hence they are not taking the drugs properly, but by persistent efforts in educating them we can find the improvement. In our study 60% of the patients had COPD and 40% had Asthma, where as in the study done by Sachdeva RA *et al.*, (8) there were 66% of Asthma and 34% of COPD patients. They state that the factors affecting these diseases include urbanization, air pollution, passive smoking, and also allergens. Countries like India and China show the prime rise in tobacco related mortality. Based on COPD Statistical Information, it has been projected that more than 50% of men from these countries smoke tobacco, explaining how COPD is the 4th cause of death in urban areas but the 1st leading cause of death in rural areas(9). It is evident that the role of doctors prescribing such medicines is very important for successful management of Asthma and COPD. In our study 18% of the patients were initially taught the inhalational technique by doctors, remaining 52% by nursing staff / technician and 30% by pharmacist. In spite of being educated by specialist, nurses / technician and pharmacist and having good education level of patients (illiteracy only 11.8%) in our study we found very poor knowledge among patients regarding all the steps in inhalational technique. Majority of the patients performed at least 4 wrong steps. They were step 14 (Cleaning spacer and proper storage), step 9 (Simultaneously inhaling deeply and slowly), step 5 (Exhale Completely before triggering the pMDI) and step 1 (Shaking the inhaler) with 73, 67, 65, 61 number of patients making mistakes in them respectively. Hence these 4 steps were stressed while giving educational intervention through demonstration. Whereas similar study done by PV Vidhya *et al.* showed that three most important steps to be stressed while educating patients were exhale normally, shake the inhaler well and holding of breath for at least 10 seconds after inhaling (5). Another study by Bharti Chogtu *et al.* showed that 72.6% of the individuals made mistakes in breathing normally for at least 30–60 s post inhaler use, which was followed by 44.2% in breathing out fully before inhalation and 43.2% in breathing out fully away from spacer (7).

The reason for this could be that busy OPDs and doctors spend lot of time in diagnosing and prescribing drugs rather than proper training and health education to the patients, as it is difficult for them. Hence we can take help of other health care professionals like nursing staff / technician or pharmacist, provided they trained well in this regard. This will not only improve their condition, but also overall disease control in COPD and Asthma patients will improve(8). The patients should be given demonstration of step by step inhalation technique and also be told of the importance of each step.

CONCLUSIONS

We conclude that significant errors were made by patients using the inhalation device. Teaching proper technique will not only improve patient's compliance but also will lead to better disease control and lesser cost and stress on both patient and health care services. Though it is the primary responsibility of the physician prescribing the inhaler to provide patient with proper instructions but since they are overburdened with too many patients, we suggest involving health care professionals like nursing staff /respiratory technicians and pharmacists may be good alternative for providing education on inhalers to the patients. Careful follow-up of these patients is necessary as training and re-training is necessary in this regard for the patients.

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Annexure 1

Table 1: Socio demography of the Study Participants

	Frequency	Percentage (%)
Gender		
Male	47	55.3
Female	38	44.7
Age		
20-35	12	14.1
36-50	27	31.8
51-65	36	42.4
>65	10	11.8
Diagnosis		
Asthma	34	40.0
COPD	51	60.0
Duration of Illness		
<5yr	42	49.4
5-10yr	36	42.4
>10yr	7	8.2
Place of Residence		

Urban	70	82.4
Rural	15	17.6
Level of Education		
Illiteracy	10	11.8
Primary	16	18.8
Secondary	49	57.6
Degree	10	11.8
Socio Economic Status (Modified B G Prasad Classification)		
Class I	5	5.9
Class II	7	8.2
Class III	36	42.4
Class IV	29	34.1
Class V	8	9.4

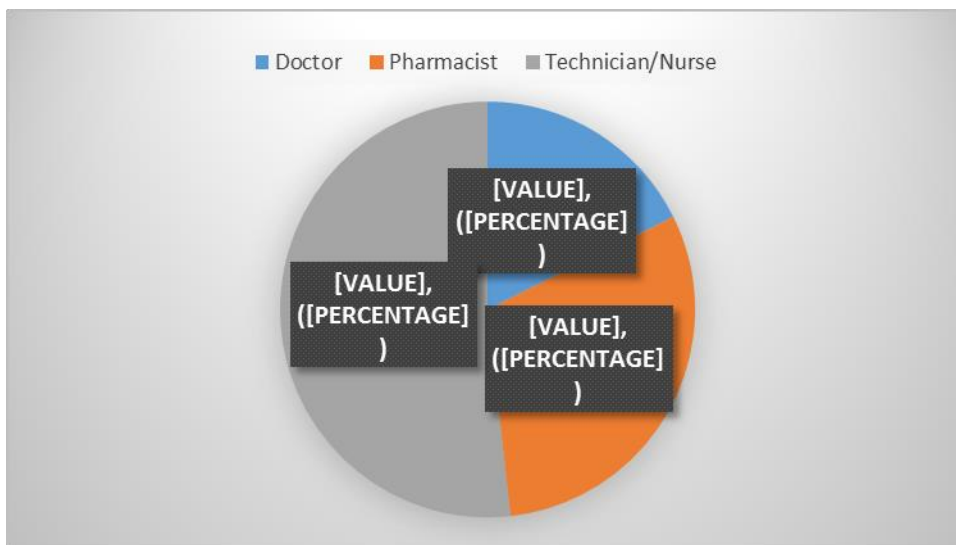


Figure 1: Distribution of Patients depending on who taught them the Inhaler technique for the first time.

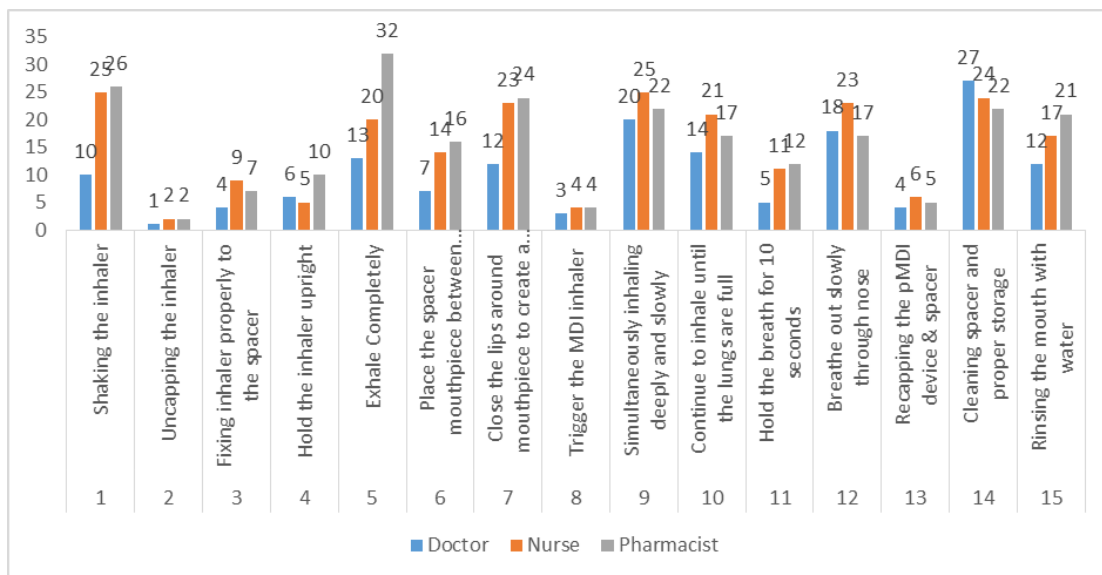


Figure 2: Distribution of Number of Patients who made errors in steps based on who taught them before educational Intervention.

Table 2: Frequency of errors in inhaler use before and after intervention.

Sl. No.	Steps performed wrongly	Before		After		Chi-square p-value
		n	%	n	%	
1	Shaking the inhaler	61	71.8	5	5.9	<0.001
2	Uncapping the inhaler	5	5.9	0	0.0	NA
3	Fixing inhaler properly to the spacer	20	23.5	0	0.0	NA
4	Hold the inhaler upright	22	25.9	8	9.4	0.005
5	Exhale Completely	65	76.5	5	5.9	<0.001
6	Place the spacer mouthpiece between the teeth	37	43.5	10	11.8	<0.001
7	Close the lips around mouthpiece to create a proper seal	59	69.4	12	14.1	<0.001
8	Trigger the MDI inhaler	11	12.9	5	5.9	0.115
9	Simultaneously inhaling deeply and slowly	67	78.8	15	17.6	<0.001
10	Continue to inhale until the lungs are full	52	61.2	12	14.1	<0.001
11	Hold the breath for 10 seconds	28	32.9	8	9.4	<0.001
12	Breathe out slowly through nose	58	68.2	20	23.5	<0.001
13	Recapping the pMDI device & spacer	15	17.6	4	4.7	<0.05
14	Cleaning spacer and proper storage	73	85.9	10	11.8	<0.001
15	Rinsing the mouth with water	50	58.8	7	8.2	<0.001

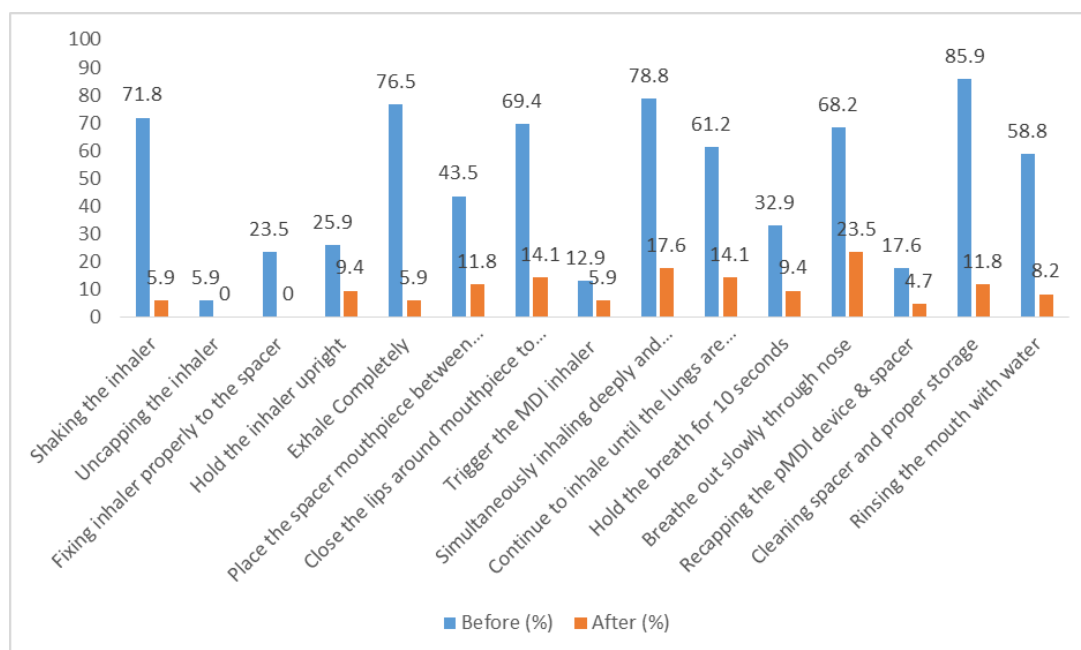


Figure 3: Distribution of improvement in inhaler usage technique before and after educational intervention.