

Original article:

Assessment of knowledge and technique of inhalation device in patients of Asthma and Chronic Obstructive Pulmonary Disease (COPD)

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ABSTRACT

Background: The present study was done to assess the inhaler technique of patients with asthma and COPD. Poor inhaler technique is one of the major setbacks in treatment of these conditions. Onus of teaching and reinforcing correct technique lies with the health care provider.

Materials and Methods: About 50 patients of asthma and COPD were recruited for the study. Personal interviews were conducted based on predesigned, pre-tested set of questions. Live assessment of each patient's inhaler technique was done, followed by correction. Patients were followed up twice fortnightly for re-assessment and reinforcement of the technique.

Results: Of the 39 asthma and 20 COPD patients, only 24 patients received health education, mostly from pulmonologists (84.74%), pharmacists (10.16%) and by quacks (3.38%). Lack of knowledge (43 patients), casual attitude (13 patients), lack of supply (7 patients) and associated stigma (5 patients) were reasons given for not taking inhalers properly. Patients using the device for longer duration performed the technique correctly ($P = 0.0031$). **Conclusion:** Inhaler technique of each patient must be checked. Timely correction, regular follow up improved technique and therapy outcomes.

Key Words: Asthma, COPD, Inhaler technique

INTRODUCTION

Chronic respiratory diseases which includes asthma and chronic obstructive pulmonary disease (COPD) account for an estimated burden of about 100 million individuals in India¹. COPD is a leading cause of morbidity and mortality worldwide and results in an economic and social burden that is both substantial and increasing. Chronic obstructive lung diseases like Asthma and Chronic obstructive pulmonary disease (COPD) are accompanied by a major burden of symptoms, healthcare utilization, loss of productivity and cost of medications on the individual and society. The

primary goal of asthma treatment is to control symptoms and to reduce emergency department use for acute asthma treatment². GINA³ (Global initiative for asthma management) and GOLD⁴ (Global initiative for chronic obstructive pulmonary disease) guidelines recommend use of inhaled corticosteroids and long acting beta agonists via inhalers. Although effective drugs and evidence-based guidelines have been developed, no major change in morbidity and mortality can be recognized and data indicate that asthma and COPD in most patients are not well controlled. The oral inhalation of medications forms the first line treatment for lung diseases. Although oral, injectable and inhaled products are available, inhaled therapy is preferred method of drug administration as this result in a faster onset of action, lower required doses, and fewer systemic adverse effects than with oral route of delivery. Inhaled technique comprises a set of procedures for drug delivery to the respiratory system. Metered-dose inhalers (MDI) are one of the drug delivery systems more frequently used by the patients⁵. Despite the long time since development and the wide use of their devices, inhaler technique errors continue to be common among the respiratory patients. Poor inhaler technique results in inadequate drug delivery and decreased symptom control⁶. Further difficulties occur because proliferation of inhaler devices has resulted in a confusing number of choices, and patients are rarely prescribed just one inhaled medication. Each inhaler type has unique operating instructions and requires different ways of handling. This creates the possibility of confusion among patients and increases errors in usage⁷. The administration of corticosteroids via inhalation is considered the optimal route for appropriate drug delivery for treatment of bronchial asthma and could reduce asthma hospitalization by as much as 80%⁸. Patient education is a critical factor in the proper use of medication⁹. Education about medications occurs mostly during doctor consultation at the time of prescribing, and yet evidence points to the passivity of the patient and a low level of information exchange during such consultation. Inhaler technique is also dependent on repeated education as inhaler technique may deteriorate after initial education. Patients are often not aware that they use their inhaled medication inadequately, and overestimate their own abilities. Another important point is that we healthcare professionals are not great at assessing technique¹⁰. Frequently the reason we get in wrong is that we don't know how to use the device ourselves. At our hospital most of the patients are referred from dispensaries where most of the patients are managed by the general physicians and not specialist, and it was observed that most of the patients are not taking their inhalers in a correct way. So, this study was planned to determine the proportion of the patients taking inhalers by correct technique, and then teaching them the correct way and giving health education about risk factors and diseases control to them. In Previous studies incorrect technique were reported in up to 94% of patients which leads to poor disease control, increase risk of exacerbations and poor quality of life. Thus by educating patients about correct way will improve disease control and quality of life of patients.

AIMS AND OBJECTIVES

1. To describe the socio-demographic profile of asthma and COPD patients presenting at respiratory clinic in a medical college hospital
2. To assess proportion of COPD and asthma patients using correct inhaler technique at baseline and after repeat visit.
3. To determine the most common errors during inhalation.

MATERIALS AND METHODS

This is a descriptive cross sectional study. Study population includes asthma and COPD patients on inhalation therapy reporting for first time to tertiary hospital. Patients included were those with stable asthma and COPD of various severities who were not under medical follow up or under investigation prior to start of study. Patients with exacerbation and concomitant chest illness and those who refused to participate in the study were excluded. Interviews were conducted based on predesigned, pretested, semi-structure schedule by the investigators in confidence under non-judgmental manner. Patients were then requested to demonstrate use of inhalation device that would be evaluated based on standard checklist. Variables in the study include socio-demographic profile of patients, smoking history, occupational history, comorbidity, knowledge about asthma and COPD inhaler technique, correct steps of inhaler technique, and reasons for not taking the inhaler properly. The standard checklist for metered dose inhaler and dry powder inhaler use had 13 and 8 steps/procedure respectively. Component on health education to patients includes awareness of disease condition (asthma, COPD), risk factors, correct way of inhaler technique, importance of compliance etc. Investigators taught them the correct way till they achieved self-sufficiency. Patients were requested for first repeat visit after 15 days and then after 30 days for assessment of compliance. Based on feasibility and time constraint, 50 consecutive patients (first visit) reporting to respiratory clinic were listed and interviewed. These patients were followed up after 15 days (second visit) and 30 days (third visit). Additional 10 percent patients were recruited to overcome attrition. Written informed consent was taken from the patient prior to study. Data collection was completed in two-months. Data was managed using MS Excel sheet by calculating descriptive statistics.

OBSERVATIONS & RESULTS

59 patients were recruited for the study of which 39 had Asthma and 20 had COPD. The general demographic characteristics of these patients are given in table 1.

Table 1: Socio demographic frequency data of the study subjects

Name of the variable		Frequency	Total
Gender	Males	33	59
	Females	26	
Marital status	Married	55	59
	Unmarried	4	
Occupational exposure to Dust/ smoke	Yes	34	59
	No	25	
Diagnosis	Asthma	39	59
	COPD	20	

Smoking Status	Smoker	9	59
	Non Smoker	33	
	Ex Smoker	17	
Education status	Graduate/ post graduate	5	59
	Intermediate certificate	1	
	High school certificate	9	
	Middle school certificate	21	
	Primary school certificate	5	
	Illiterate	18	
Occupation	Professional	0	59
	Semi professional	1	
	Clerical	0	
	Shop Owner	0	
	Farmer	4	
	Skilled worker	11	
	Semi-skilled worker	22	
	Unemployed	21	
Monthly income	>32,000	0	59
	16,020-32,049	7	
	12,020-16,019	10	
	8,010-12,019	31	
	4,810-8,009	10	
	1,601-4,809	1	
	<1,600	0	
Age (mean, max-min) in years	47.95 (74-14)		
Duration of smoking (mean, max-min) in months.	293.25 (444-120)		

Among the 59 patients observed 33 (55.93%) were males and 26 were females (44.07%). The mean age of the patients was 47.95 (74-14). About 55.93 % patients were non-smokers, 13.55% were smokers and 28.81% were ex-smokers. Nearly 30.50% of the patients were illiterate and only 5 (8.47%) were graduates. The mean duration of disease was 122.42 (months) and the mean duration of usage of the device was 50.85 (in months). In this study

about 24 patients received health education and 35 patients did not get any health education. In our study we found that only about 3.38 % patients had received education about inhaler from quacks and maximum (about 84.74 %) patients from pulmonologists, some also received education from pharmacists (10.16 %) and 1 patient from general physician. Nearly 34 patients were exposed to chemicals/ dust/smoke and 25 patients did not get exposed to any occupational pollutants. Maximum patients (52.54%) have monthly income ranging Rs. 8,010-12,019/-. 28 patients followed up regularly whereas 31 did not. About 45.76% patients were hospitalized in view of their uncontrolled state. Out of 59 patients 18 had co-morbid disease association like hypertension and diabetes. None of the patients had awareness regarding step up /step down therapy. Nearly 26 patients had awareness regarding disease/allergy and 58 patients were using inhaler at home, and only 1 patient was not using inhaler at home. Description according to selected parameters is given in table 2.

Table 2: Description according to selected parameters:

S.No.	Parameter		
1.	Average duration of illness mean(SD), median (Q1-Q3) in months	122.42 (131.81), 72 (21-180)	
2.	Average duration of inhaler use mean (SD) in months	50.85 (58.3)	
3.	Regular follow up with the doctor	Yes	31
		No	28
4.	Regular inhaler therapy actually taken	Yes	21
		No	38
5.	Occupational exposure to dust/smoke	Yes	34
		No	25
6.	Inhaler prescribed by	GP	1
		Pulmonologist	50
		Pharmacist	6
		Quack	2
7.	Hospitalization within last 1 year due to illness	Yes	27
		No	32
8.	Presence of a comorbid disease HT/DM	Yes	18
		No	41
9.	Received Health Education on disease condition	Yes	24
		No	35
10.	Awareness regarding Disease/ allergy	Yes	26
		No	33
11.	Awareness regarding step up/down	Yes	0
		No	59
12.	Knowledge of use of medicine	Yes	19

		No	40
13.	Using inhaler at home	Yes	58
		No	1

We found that 43 patients told that reason for not taking inhaler properly was lack of knowledge, 13 patients were not using inhaler due to their casual attitude, 7 patients due to lack of supply and 5 patients due to stigma associated. Reasons for which the patients were not taking the inhaler correctly are described in table 3.

Table 3: Reasons for not taking medicines (* more than one responses were given)

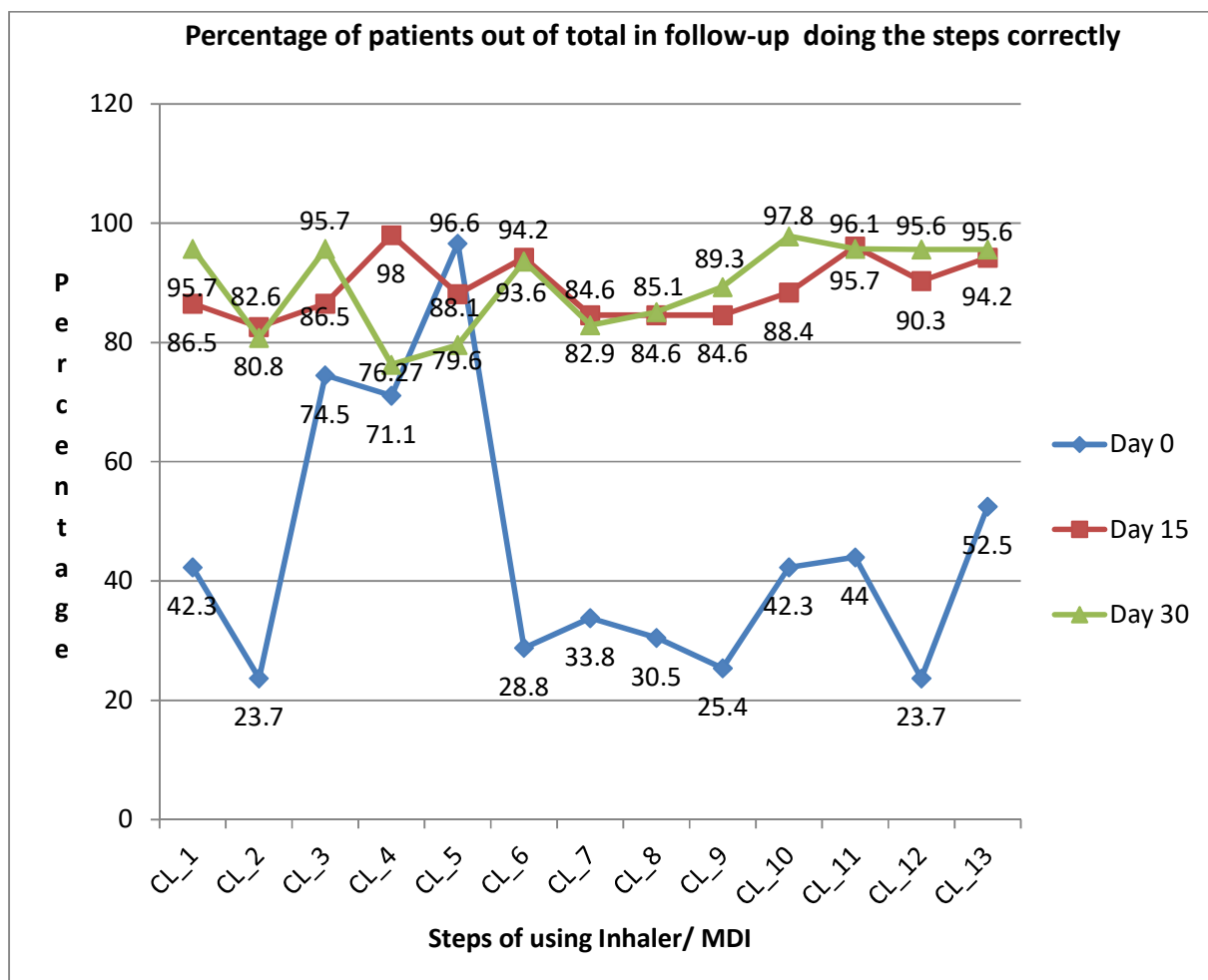
S.No.	Reason	No. of Patients
1.	Lack of knowledge	43
2.	Lack of money	2
3.	Lack of supply	7
4.	Casual attitude	13
5.	Stigma associated	5

In our study, the step at which maximum number of patients committed mistake was exhalation (76.3%) [Figure 1] followed by not waiting between the two doses taken (76.3%). It was also found that patients who had been using the device for longer duration performed the technique correctly ($P = 0.0031$). The patients who were on regular follow up took the inhaler more regular as compared to those who were not on regular follow up and given in table 4.

Table 4:

		Regular Follow up		p-value
		Yes	No	
Actually taking Inhaler	Yes	15	6	0.031(significant)
	No	16	22	
Total		31	28	59

The patients who were on regular follow up took the inhaler more regularly as compared to those who were not on regular follow up. The graph plotted shows that rise of patients taking inhaler steps correctly when taught 2-3 times. Figure: Percentage of subjects in follow up correctly doing the steps over the visits on Day 15 and 30th.



(CL= Check List No.)

DISCUSSION

Our study reinforces the fact that most of the patients are not taking inhalers by proper technique, and by repeated efforts of educating them it can be improved. In our study patients enrolled were diagnosed Asthma (39 patients) and COPD (20 patients) who were already taking inhalers for their treatment.

Factors affecting these diseases include urbanization, air pollution, passive smoking, and also allergens²⁹. Asian countries such as India and China showed the largest increase in tobacco related mortality. Based on COPD Statistical Information³⁰, it has been estimated that more than 50% of men from these countries smoke translating to COPD being the 4th cause of death in large urban areas but the 1st leading death in rural areas. Out of total 59 patients occupational dust, smoke exposure was present in 34 patients, as we are receiving patients from industries. Almost half of patients (25) were either smokers or ex-smokers.

Most of the patients (41 out of 59) were educated. Only 18 were illiterate. In spite of patients having basic level of education, it was found that most of the patients were not following all the steps of taking inhaler in correct way. There could be gaps at various levels. The person who is prescribing or educating the patient is not himself trained.

The editorial by Papiet et al on the call for action in the neglected field of Inhalers for Asthma, has described the problems in teaching patients how to use inhaler devices and also the difficulties in maintaining the technique. The role of the doctor in patient education is important as the doctor-patient relationship is essential for successful management of asthma and COPD.³¹ In our study mostly inhalers were prescribed by specialists. In spite of being educated by specialist 35 patients out of 59 have not received health education on disease condition and allergen avoidance. No patient was aware of step up step down regimen. The reason for all these could be over busy OPD's in government set up, with too much patient load. Doctors spend most of their time in making diagnosis and then prescribing the correct drugs for patients. Here help from supporting staff like pharmacist and nurse can be taken in providing education to patients about their disease condition, their short term and long term goals for managing their disease. This will not only improve their condition, also overall disease control will improve. In a country like India, it may not be feasible to initiate inhalers only at the level of specialists, but special care may be needed to the group of patients who are initiated on Inhaled medications by non-specialists / non-specialty hospitals, and the inhalation technique of such patients may need more close monitoring and review. So, the patients should be given demonstration by some trained professionals who not only knows the steps but also knows the importance of each step.

About 27 patients needed to be hospitalized at least one time in last one year. This shows that these patients are of uncontrolled asthma and their condition is not improving even after taking inhalers. Reason for this may be either not taking inhalers regularly or not in correct way so proper dosage is not received by them.

In our study various reasons given by patients for not taking medicines regularly were lack of knowledge(43), casual attitude(13), lack of supply of medicine(7), stigma associated(5), lack of money(2). Income is also reason for not proper medication taken by patient, although government is giving free medicine supply. However, it is noticed that there are supply-chain issues with the provision of variable devices during a financial year. Patient may be started on MDI due to need and availability in the hospital, but overtime may have to switch to DPI due to non-availability of MDI. So, patients have to be educated repeatedly about inhaler technique and disease condition in order to achieve disease control. Inhaler technique must be rechecked and education must be reinforced regularly in order to maintain correct technique, as inhaler technique deteriorates again after education³²⁻³⁴. Inhaler should be used correctly because improper usage reduces drug delivery to the target. Incorrect use of inhalation devices may lead to uncontrolled disease state, unwanted side effects and can also cause higher treatment costs. According to Fink and Rubin, US\$ 5-7 Million are annually wasted in the USA because of inhaler misuse³⁵. Bsheti et al. have demonstrated that a simple educational intervention taking only 2.5 minutes and targeting inhaler technique was feasible for delivery by community pharmacists and resulted in improved clinical outcomes for patients with asthma. Doctors should not rely on the patient's assurance that they know how to use their inhaler. Patients are unlikely to ask for advice because most are unaware that their inhaler technique is faulty. In our study it was found that patients who were on regular follow up with doctor took inhalers more regularly as compared to those who were not on regular follow up. In spite of small sample size of our study these findings were statistically significant. When we followed up patients on 15th day after first visit and again at 30th day after first visit, we checked for steps of inhaler technique and re educated them about correct steps. Percentage of patients doing steps of inhaler

technique correctly improved. The amount of instruction on inhaler technique given by health care professionals increases patients' likelihood of correct technique. However, published studies from around the world suggest that as many as 25% of patients with asthma or COPD have never received verbal inhaler technique instruction. When given, instruction is often rushed, of poor quality and never reinforced³⁶. Only an estimated 11% of patients receive follow-up assessment and education on their inhaler technique³⁷. Several studies have demonstrated that community pharmacists can provide effective training in correct inhaler technique³⁸. In patients with asthma, interventions to correct inhaler technique have been shown to improve measures of asthma control such as patient-reported perceived asthma control [3], scores for asthma-related quality of life questionnaires [15], asthma severity classification [4], and lung function measures such as peak expiratory flow (PEF) [15] or PEF variability³⁹.

National and international guidelines for asthma and COPD management state that inhalation technique should be assessed regularly, and corrected if inadequate. Regarding these recommendations, there is a need for studies to explore the effectiveness and frequency of patient education and consider interventions to improve inhalation technique. Our study objectives, therefore, were to survey the quality of inhalation technique in patients with asthma or COPD and to determine the effect of intervention on inhalation technique by means of standardized procedures.

CONCLUSION

The inhaled route remains crucial for the treatment of bronchial diseases. Incorrect inhaler technique is very common and probably results from faulty training. And as we know, drug deposition and subsequent treatment effectiveness are highly dependent on inhalation technique, which is incorrect in many patients with asthma and COPD. Many inhalation devices are available and others are currently being developed with the aim of simplifying required handling, and thus improving treatment safety. Nonetheless, at present, proper training and regular checking of inhalation technique remain critical to optimize treatment effectiveness. Although guidelines acknowledge that inhalers should be prescribed only after patients have been trained to use them properly and have demonstrated this ability. Involved healthcare professionals have to be adequately trained before providing this service. The results of the study highlight the importance of high quality patient training on inhaler techniques and also increasing awareness among healthcare providers regarding the necessity for proper training before initiating inhalers.

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