



## ASSESSMENT OF INHALER TECHNIQUE FOR MDI IN COPD PATIENTS ATTENDING NALANDA MEDICAL COLLEGE & HOSPITAL; A TERTIARY CARE TEACHING HOSPITAL OF BIHAR

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### ABSTRACT

**Background:** Inhaled medications are cornerstone for the management of chronic obstructive pulmonary disease (COPD) and MDI (metered dose inhaler) is most commonly prescribed inhaler. The correct use of inhaler is very important aspect to be considered when evaluating the progress of disease treatment in COPD patients. Incorrect inhaler technique is associated with decreased drug deposition in the airway and so poor disease control & greater systemic side effect. Incorrect technique of inhaler use was reported in more than 80% of patients. The aim of this study was to assess inhaler technique of MDI amongst COPD patient attending Nalanda Medical College & Hospital, Patna.

**Methods:** A prospective observational study was conducted in which through a face to face interview assessment of inhaler technique was performed. We developed a checklist of steps (total 8) of correct use of MDI on the basis of instruction provided by the manufacturer. When one or more steps were wrong, technique was defined as incorrect.

**Results:** Total 80 patients (mean age 60.1 year) were evaluated. Fifty-eight patients (72.5%) performed at least one step incorrectly and we designated them wrong technique. Thus only 27.5% patient correctly demonstrated all steps. The most frequent error in handling the MDI was the step "breath out gently to residual volume". A lower percentage of incorrect inhaler technique in patients with higher education was observed. We also observed a lower percentage of incorrect inhaler technique in the elderly. Our data also suggest that females when compared to male present lower incorrect inhaler technique. Our study also found lower percentage of incorrect inhaler technique if patient were trained by doctor and it was highest if trained by pharmacist.

**Conclusion:** Incorrect use of MDI is very common among COPD patients. So, inhaler technique in COPD patient needs face-to-face training which should be done preferably by doctor himself or by a trained nurse at each visit, specially before changing the treatment regimen.

**KEYWORDS :** Inhaler technique, MDI, COPD

### INTRODUCTION

Inhaled medications are cornerstone for the management of chronic obstructive pulmonary disease (COPD), and their correct usage requires continuous training [1,2]. Among various inhaled formulations (metered dose inhaler [MDI]/dry powder inhaler [DPI]/nebulizer), MDI is most commonly prescribed [3]. With the introduction of numerous new inhaler devices over the past 40 years, there has not been substantial improvement in proper use by patients [4].

If used correctly, these deliver a smaller effective amount of the drug directly to the site of action in the lungs, with a faster onset of effect and with reduced systemic availability which minimizes adverse effects [4]. In spite of inhalers being the preferred method of medication delivery to the lungs, evidence suggests that many patients are unable to use them effectively [4]. Incorrect inhaler technique is associated with decreased drug deposition in the airway, wastage of medication and hence poor disease control, increased emergency hospital admissions & greater systemic side effects [5].

The correct use of inhaler is a significant aspect to be considered when evaluating the progress of disease treatment in COPD patients, and guidelines also suggest regular assessment of inhaler technique at each clinic visit, to enhance the airway drug delivery [1]. Correct inhaler technique depends on correct preparation and handling of the device before inhalation and an optimal inhalation technique [6] as well as on the inhaler type, therefore, patients have to understand the correct steps for their own inhaler. GOLD (Global initiative for Chronic Obstructive Lung Disease) & GINA (Global Initiative for Asthma) both

emphasize the importance of assessing inhaler technique and correcting poor inhaler technique before escalating therapy [7,8].

Errors in the use of MDI have also been reported in earlier studies [9,10]. Many previous studies have reported incorrect inhaler technique in more than 80% of the patients [11-16]. But there is lack of such data for India specially for Bihar which makes situation difficult to address.

The aim of this study was to assess inhaler technique of MDI amongst COPD patient attending Nalanda Medical College & Hospital, Patna. The secondary aims were to investigate whether age, gender or level of education shows any trend with incorrect inhaler technique.

### MATERIALS AND METHODS

A prospective observational study was conducted in the Department of Pharmacology, NMCH Patna and patients were selected from Outpatient Department of Medicine, NMCH Patna from November 2019 to December 2019 on the basis of inclusion and exclusion criteria.

COPD patients previously diagnosed on the basis of history, clinical examination and spirometry, who were using only MDI (without spacer) as inhalational therapy for at least 1 month were screened for enrollment.

Patients with upper respiratory tract infection within preceding week, acute exacerbation of symptoms of COPD or hospitalization due to any cause within previous 2 months, history of arthritis of hand or visual limitation or active cardiac disease or pulmonary surgery were excluded.

Total 80 patients were selected for the study. Prior to initiation of the study, the purpose and details were explained to patients and written consent was obtained. Through a face to face interview, assessment of inhaler technique was performed. Patients were allowed to demonstrate their inhaler technique using their prescribed MDI for one puff, step by step beginning from removing of cap of MDI. We developed a checklist of steps of correct use of MDI on the basis of instruction provided by the manufacturer. The total number of steps were eight (details presented in Table 1) and every step was assumed essential. When one or more steps were wrong, technique was defined as incorrect.

**TABLE 1 Steps of correct use of MDI**

STEP	DETAILS
1	Take off the Inhaler cap
2	Shake the MDI thoroughly
3	Hold the MDI upright & hold Head in vertical position
4	Breath out gently to residual volume
5	Place mouthpiece between lips & teeth to seal the mouthpiece
6	Inhale slowly & simultaneously press the canister
7	Continue slow & deep inhalation
8	Take inhaler out of mouth & hold breath for at least 10 sec

Patients were also evaluated for potential factors associated with incorrect inhaler technique including age, sex, level of education (uneducated, primary [ up to Standard V ] or higher [above Standard V ]). The person who trained them about how to use inhaler (doctor, nurse or pharmacist) was also assessed. Data were expressed as mean and standard deviation (SD) or percentage (%) where appropriate.

**RESULTS**

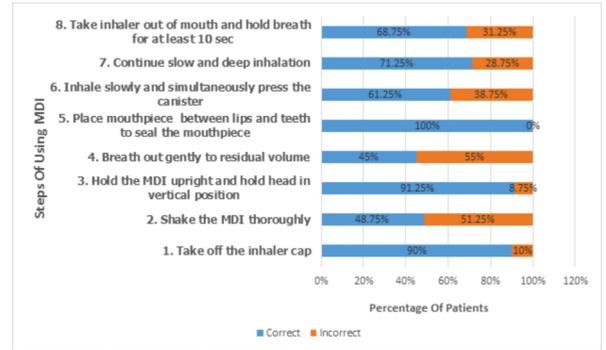
The mean age of the 80 patients was 60.1 year (SD = 9.9), having 15% elderly patient (age 70 years or more). Patients were mostly male (70%). Most of them 56.2% were having primary education while 17.5% of patients were uneducated. Only 26.2% of them were having higher than primary education. Training about the correct inhaler technique was mostly done by nurse (38.7%) followed by pharmacist (33.7%) and doctor (27.5%). Table 2 shows Patient demographic characteristics.

Characteristics	Number of Patients (n = 80)	Percentage of Patients showing incorrect inhaler technique
<b>Gender</b>		
Male	56	75%
Female	24	66.7%
<b>Age</b>		
<70 years	68	73.5%
≥70 years	12	66.7%
<b>Education level</b>		
Uneducated	14	71.4%
Primary	45	84.4%
Higher	21	47%
<b>Training of Inhaler technique done by</b>		
Doctor	22	63.6%
Nurse	31	70.97%
Pharmacist	27	81.48%

Fifty-eight patients (72.5%) performed at least one step incorrectly and as each step was essential we designated them wrong technique. Thus only 27.5% patient correctly demonstrated all steps. Step 5 was correctly performed by all

the patient. Eight patients (10%) forgot to even take off the cap before using inhaler. Most common mistake (55%) was in performing step 4 i.e., breath out gently to residual volume followed by step 2 (51.25%) i.e., shake the MDI thoroughly before use. 38.75% patient showed mistake in co-ordination i.e., inhaling slowly and simultaneously pressing the canister. Details about each step is given in Figure 1.

**FIGURE 1 Stepwise assessment of Inhaler technique of Patients for MDI**



11.25% patient made only one mistake while 12.5% made mistake in two of the eight steps. A few patients (2.5%) did mistake in six steps (maximum steps done wrong in this study). Maximum patient performed four steps incorrectly (21.25%) followed by 3 steps (18.75%).

**DISCUSSION**

This study shows that a large percentage of COPD patients treated at NMCH, Patna used their inhaler incorrectly by performing at least one essential step of using MDI incorrectly. A previous study showed that incorrect inhaler technique remains common and is associated with poor clinical control and increased expenditure of health care resources in COPD patients [17].

A lower percentage of incorrect inhaler technique in patients with higher education has been reported previously [17] & we also found similar results. But we observed a lower percentage of incorrect inhaler technique in the elderly, in contrast to other studies [18,19]. Our data also suggest that females when compared to male present lower incorrect inhaler technique. But, other studies reported not such difference in inhaler technique related to gender [17,18].

Our study also found lower percentage of incorrect inhaler technique if patient were trained by doctor and it was highest if trained by pharmacist.

**CONCLUSION**

Incorrect use of MDI is very common among COPD patients. Since, inhaled medications are cornerstone for the management of chronic obstructive pulmonary disease (COPD) so, their correct usage requires continuous training which should be done preferably by doctor himself or by a trained nurse. If used correctly, these deliver a smaller effective amount of the drug directly to the site of action in the lungs, with a faster onset of effect and with reduced systemic availability which minimizes adverse effects. At each visit patient should be checked for their inhaler technique specially before changing the treatment regimen.

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