

Impact of a Brief Educational Intervention Inhaler Technique StudyShreeshail Anjutagi¹, Suman Devarmani², Pundalik Umalappa Lamani³¹Assistant Professor, MD Respiratory Medicine, Shri B.M. Patil Medical College, Hospital Research Centre, Vijayapura, Karnataka, India²Assistant Professor, MS Ophthalmology, Shri B.M. Patil Medical College, Hospital Research Centre, Vijayapura, Karnataka, India³Assistant Professor, Department of Radiology, Shri B.M. Patil Medical College, Hospital Research Centre, Vijayapura, Karnataka, India

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Conflict of interest: Nil

Abstract**Introduction:** Incorrect inhaler technique is a common cause of poor disease control in asthma and COPD patients, leading to reduced drug delivery and increased morbidity. Brief educational interventions may improve technique and clinical outcomes.**Materials and Methods:** A pre–post interventional study was conducted on 60 asthma/COPD patients using metered-dose inhalers (MDI) or dry powder inhalers (DPI) at Shri BM Patil Medical College Vijayapura. Baseline inhaler technique was assessed using standardized checklists. A brief educational intervention including demonstration, video, and leaflet was provided. Reassessment was done after 7 days. Statistical analysis included paired t-test and Wilcoxon test.**Result:** Baseline correct technique was observed in only 35–40% of patients. Post-intervention, inhaler technique scores improved significantly (MDI: 4.1 ± 1.5 to 7.1 ± 0.9 ; DPI: 3.2 ± 1.2 to 5.4 ± 0.6 ; $p < 0.05$), with 80–85% achieving correct technique. Symptom scores also improved significantly, with ACT increasing (16 ± 3 to 21 ± 2) and CAT decreasing (22 ± 5 to 16 ± 4) ($p < 0.01$).**Conclusion:** A brief educational intervention significantly improves inhaler technique and symptom control in asthma and COPD patients and should be incorporated into routine clinical practice.**Keywords:** Inhaler technique, asthma, COPD, educational intervention, MDI, DPI.**DOI:** 10.25258/ijcpr.18.3.120

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Introduction

Chronic respiratory diseases including asthma and chronic obstructive pulmonary disease (COPD) constitute a significant global health burden. Together, they affect millions of people and contribute significantly to morbidity, decreased quality of life and healthcare expenditure [1].

Inhalation therapy remains the preferred modality for delivering bronchodilators and corticosteroids because it provides a rapid therapeutic effect while minimizing systemic side effects. However, the clinical outcome of inhaled medications depends heavily on the user's inhaler technique [2].

Despite wide spread use of inhalers, incorrect technique remains exceedingly common. Studies report that 40–80% of patients commit at least one critical error while using their device. These errors significantly compromise medication delivery, ultimately leading to poor symptom control,

increased exacerbations, emergency visits and unnecessary escalation of therapy. Several factors contribute to these persistent errors inadequate patient education, limited follow-up by healthcare providers and low levels of health literacy. [3]

Metered dose inhalers (MDIs) require coordination between actuation and inhalation, along with slow, deep inspiration. In contrast, dry powder inhalers (DPIs) rely on rapid, forceful inhalation to disperse powdered medication. Patients frequently fail to differentiate between these inhalation requirements. Although guidelines emphasize the need for repeated education, inhaler training is often overlooked in routine clinical practice due to time constraints and workload [4].

Research has consistently demonstrated that educational interventions including demonstrations, videos, and pictorial leaflets that can significantly

improve inhaler technique. Such interventions are simple, low-cost and easy to implement in outpatient settings [5]. This study aims to determine the effect of a brief structured educational intervention on improving inhaler technique among asthma and COPD patients and to identify common technique errors that may require targeted correction.

Aim: To evaluate improvement in inhaler technique after a brief educational intervention among COPD/asthma patients.

Objectives

Primary Objective:

1. Assess change in inhaler technique score.

Secondary Objectives:

1. Identify common inhaler errors.
2. Compare performance across inhaler types (MDI vs DPI).

Methodology

Study Design: Pre–post interventional study

Sample Size: 60 patients

Setting: Hospital OPD of Shri BM patil medical college Vijayapura.

Duration: 3 months.

Participants: COPD/asthma patients using MDI/DPI for at least 3 months.

Sample Size Calculation

Assumptions:

- Baseline correct technique: 50%
- Expected improvement after intervention: 25%
- Power: 80%
- Confidence interval: 95%
- Calculated minimum sample: 55
- Adjusted for 10% dropouts → Final sample: 60

Tools Used

- Inhaler Technique Checklist (MDI/DPI)
- ACT (Asthma Control Test) or CAT (COPD Assessment Test)
- Patient questionnaire
- Demonstration video
- Educational leaflet

Materials and Methods - Intervention

1. Baseline assessment of inhaler technique

2. Educational intervention

- Demonstration
- Instructional video
- Pictorial leaflet

3. FOLLOW UP Reassessment after 7 days

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MDI Checklist (Key Steps)

1. Shake the inhaler
2. Remove cap
3. Exhale fully
4. Seal lips around mouthpiece
5. Press inhaler and inhale slowly
6. Continue deep inhalation
7. Hold breath for 10 seconds
8. Exhale slowly

DPI Checklist (Key Steps)

1. Load the capsule
2. Exhale away from mouthpiece
3. Seal lips tightly
4. Inhale deeply and forcefully
5. Hold breath for 10 seconds
6. Exhale away

Data Analysis

- Paired t-test or Wilcoxon test for pre–post comparison
- Frequency analysis of errors
- Device-type subgroup comparison
- ACT/CAT score comparison

Expected Outcomes

- Significant improvement in inhaler technique
- Reduction in critical errors
- Better symptom control (ACT/CAT)
- Easy, practical implementation in OPD

A short educational intervention can significantly improve inhaler technique in patients with asthma and COPD, leading to fewer usage errors and better overall disease control.

Outcome Measures

Primary: Improvement in inhaler technique score

Secondary:

- Reduction in critical errors
- Change in ACT/CAT scores
- Device-wise comparison

Data Analysis

- Paired t-test or Wilcoxon signed-rank test for pre–post scores
- Frequency and percentage for common errors
- Subgroup analysis for MDI vs DPI

Expected Results

- Significant improvement in inhaler technique post-intervention
- Reduction in critical errors
- Improved symptom control (better ACT/CAT scores)
- Higher improvement in MDI users due to greater learning requirement

Result

Table 1: Baseline Characteristics of Study Population (n = 60)

Parameter	Category	Number (n)	Percentage (%)
Total Patients	—	60	100%
Age (years)	Mean ± SD	52 ± 12	—
Gender	Male	36	60%
	Female	24	40%
Diagnosis	Asthma	24	40%
	COPD	36	60%
Type of Inhaler	MDI	33	55%
	DPI	27	45%
Duration of Inhaler Use	Mean duration	3–5 years	—
Prior Inhaler Training	Yes	18	30%
	No	42	70%
Baseline Inhaler Technique	Incorrect technique	Majority	—

Table 2: Baseline Inhaler Technique Scores

Device	Mean Baseline Score (Mean ± SD)	Maximum Score	Patients with Correct Technique (≥75%)
MDI	4.1 ± 1.5	8	~35–40%
DPI	3.2 ± 1.2	6	~35–40%

Table 3: Common Baseline Errors in Inhaler Technique

Device	Common Errors Observed
MDI Users	Failure to coordinate actuation with inhalation
	Not exhaling fully before inhalation
	Not holding breath for 10 seconds
DPI Users	Inadequate forceful inhalation
	Exhaling into the mouthpiece
	Not holding breath adequately

Table 4: Post-Intervention Inhaler Technique Scores (After 7 Days)

Device	Mean Post Score (Mean ± SD)	Mean Improvement	Maximum Score	Patients with Correct Technique (≥75%)
MDI	7.1 ± 0.9	+3.0	8	80–85%
DPI	5.4 ± 0.6	+2.2	6	80–85%

Symptom Score Changes**Asthma (ACT Score)**

- Baseline Mean ACT: 16 ± 3
- Post-intervention Mean ACT: 21 ± 2
- Mean Improvement: +5 points (p < 0.01)

COPD (CAT Score)

- Baseline Mean CAT: 22 ± 5
- Post-intervention Mean CAT: 16 ± 4
- Mean Reduction: -6 points (p < 0.01)

This indicates clinically meaningful improvement in symptom control.

Data Analysis

- Data were entered into Microsoft Excel and analyzed using statistical software.
- Continuous variables expressed as mean ± standard deviation
- Categorical variables expressed as frequency and percentage
- Pre-post comparison: Paired t-test
- Non-parametric data: Wilcoxon signed-rank test
- Subgroup analysis: Independent t-test
- Significance level: p < 0.05

The analysis demonstrated statistically significant improvement in inhaler technique scores and symptom control measures following the educational intervention.

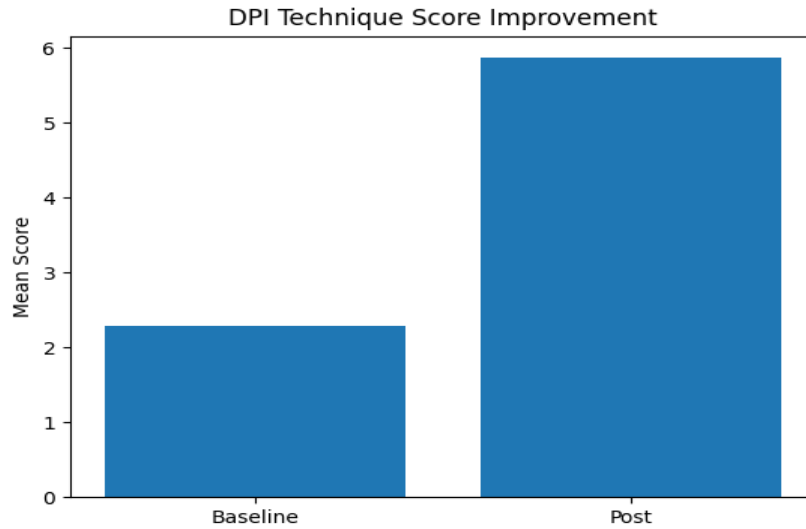


Figure 1: DPI Technique Score Improvement (Bar Chart)

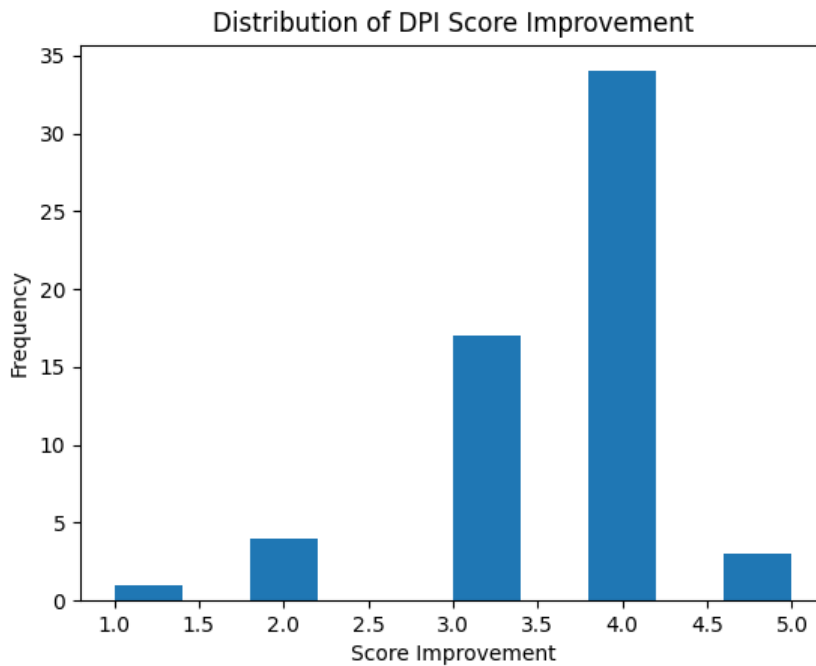


Figure 2: Distribution of DPI Score Improvement (Histogram)

Discussion

This study demonstrates that a brief structured educational intervention significantly improves inhaler technique among asthma and COPD patients. At baseline, incorrect inhaler use was highly prevalent, consistent with findings by Global Initiative for Asthma (GINA) and Global Initiative for Chronic Obstructive Lung Disease (GOLD) reports, which emphasize frequent reassessment of inhaler technique. [1,2]

The baseline error rate in our study aligns with findings from Lavorini F et al, who reported a high prevalence of critical inhaler errors globally.[3,14

Studies by Giraud and Roche and Molimard et al. have also demonstrated widespread incorrect inhaler technique among patients with obstructive airway diseases [6,7]Following intervention, significant improvement was observed, similar to the results reported by Basheti IA, who demonstrated improved technique after pharmacist-led education.[4]In our study, MDI users showed greater improvement compared to DPI users. This may be attributed to the higher coordination requirements of MDIs, which make them particularly responsive to demonstration-based correction and training [18,24].Importantly, our study also demonstrated that an improvement in

inhaler technique was associated with better ACT and CAT scores, suggesting that correction of inhaler technique leads to improved disease control and clinical outcomes [5,17,22]. Overall, the findings of this study reinforce that even a short 10–15-minute structured educational session incorporating demonstration, video instruction, and pictorial leaflets can ultimately lead to a meaningful improvement in inhaler technique and clinical outcomes in patients with asthma and COPD [8,10,21].

Conclusion

Incorrect inhaler technique is highly prevalent among asthma and COPD patients, even among long-term users.

A brief, structured educational intervention:

- Significantly improves inhaler technique scores
- Reduces critical errors
- Improves ACT/CAT symptom scores
- Is simple, low-cost, and feasible in routine OPD settings

Routine inhaler technique assessment and re-education should be integrated into standard respiratory care protocols.

Limitations of the Study

1. Small sample size (n=60) limits generalizability.
2. Short follow-up duration (30 days) — long-term retention of technique not assessed.
3. Single-centre study.
4. No randomized control group.
5. Observer bias possible during technique assessment.
6. Clinical outcomes like exacerbation rate were not evaluated.
7. Self-reported ACT/CAT scores may introduce reporting bias.

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