



ASSESSMENT OF CORRECT USE OF INHALER DEVICES AMONG PATIENTS FOR OBSTRUCTIVE PULMONARY DISEASES

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ABSTRACT

Background: Common respiratory conditions include Asthma and Chronic obstructive pulmonary disease (COPD). Improper use of inhalers remains a barrier to achieving optimal disease outcomes. Present study is to assess the correct use of inhaler techniques among the patients with asthma and COPD. **Material & Method:** This prospective observational study was conducted among the patients with asthma and COPD attending to out-patients department of Respiratory Medicine for duration of 6 months from July to December 2022. Commonly used inhaler devices were evaluated among the patients using for symptoms relief. Patients above 18yrs with diagnosis of Asthma or COPD, regular on inhaler medication and willing to be part of study were included. All the patients were evaluated for the correct use of inhaler technique by the physician. Patients were asked to demonstrate the method by which they used the inhaler device at home. The checklist proforma was used to check the correct technique of the inhaler device. **Result:** A total of 100 patients with COPD in 63 patients and 37 patients with Asthma were included. The present study found that total 14 patients could perform all the steps correctly during the use of inhalers. It was seen that 86 patients were unable to use the inhalers properly. **Conclusion:** This study discovered a significant rate of improper inhaler use in this region. Proper inhaler education is critical for optimal treatment with these inhaler devices.

KEYWORDS : Asthma, Chronic Obstructive Pulmonary Disease, Inhalers, Metered Dose, Dry Powder.

Introduction

Common respiratory conditions include Asthma and Chronic obstructive pulmonary disease (COPD). Approximately 1–18 percent of people worldwide suffer from Asthma. 11.7 percent with COPD in 2010, and estimated death of 3.23 million in 2019 as per WHO report.—(13) Smoking tobacco and other pollutants are the major cause for the symptoms and severity among the patients with respiratory disease and other tissue damage.—(47)

In 1929, the Camps of England evaluated and recommended the use of inhaled epinephrine, stating the technique of “Spraying to the trachea-bronchi”.(8,9) Inhalation therapy has become the mainstay of treatment for COPD and Asthma, and proper training is required to use them correctly. When examining people with Asthma or COPD, proper and accurate use of inhaler devices is one of the most crucial factors to take into account, and recommendations stress the need of evaluating inhaler technique to increase the effectiveness of medication delivery (2,3). Insufficient inhaler usage is one of the most frequent causes of COPD and Asthma control failure.(2)

Available devices for administering these drugs include pressurized metered dose inhalers (MDIs), alone or mounted in a spacer) and dry powder inhalers.(10) Asthma and COPD treatment are both impacted negatively by incorrect and inappropriate inhaler usage impact on the therapeutic effect, which lead to poor symptom control and disease management.—(1114)

There is limited literature available related to the utility of inhaler devices among the Indian population. Hence this study was aimed to assess the correct use of inhaler techniques among the patients with Asthma and COPD.

Material & Method

This prospective observational study was conducted among the patients with Asthma and COPD attending to out-patients department of Respiratory Medicine for duration of 6 months from July to December 2022. Commonly used inhaler devices ie, pressurized metered dose inhalers (MDIs) alone or mounted in a spacer and dry powder inhalers, were evaluated among the patients using for symptoms relief. Patients above 18yrs with diagnosis of Asthma or COPD, regular on inhaler medication and willing to be part of study were included. Patients with acute exacerbation in last 4 weeks were excluded from the study. Patients were included in study after obtaining the informed consent. All the patients were evaluated for the correct use of inhaler technique by the physician. Patients were asked to demonstrate the method by which they used the inhaler device at home. The checklist proforma was used to check the correct technique of the inhaler device as validated in the literature.

Figure 1: checklist proforma for MDI

- Step 1: Remove cap from the mouth-piece of canister, hold upright.
- Step 2: For the first use or using after more than 7 days, shake and release one puff into air.
- Step 3: Stand or sit straight. Breathe out through the mouth.
- Step 4: Place the mouth-piece between teeth and close lips without leaving any gap.
- Step 5: Breathe in and release one dose with simultaneously breathing in.
- Step 6: Remove the inhaler and close the mouth immediately.
- Step 7: Hold breath for 10 seconds or if possible.
- Step 8: Wait for at least one minute before taking the second dose.

Figure 2: checklist proforma for DPI

- Keep the rotahaler upright
- Insert rotahaler with transparent end down
- Keep rotahaler horizontal
- Rotate both ends to open capsule
- Exhale to residual volume
- Keep rotahaler level and put mouth piece between teeth and lips
- Inhale powder forcefully and deeply
- Remove rotahaler from mouth and hold breath for 5 seconds
- Exhale away from mouthpiece
- If any powder is left, repeat steps from 1
- Open the rotahaler and discard the capsule

When one or more errors were done by patients in using the inhaler devices, the technique was incorrect. After the evaluation, correct techniques were demonstrated to each patient. Statistical analysis: the analysis was done using the SPSS V26.0 operating on windows 10. The data were represented using tables and figures, mean and standard deviation.

Result:

A total of 100 patients with COPD in 63 patients and 37 patients with Asthma. Among the included patients 65 were males and 35 were female patients, with male preponderance in the study. The patients were distributed in the age group of 20-80yrs with mean age of 64.21±10.2 in COPD group and 44.65±5.66 in Asthma group. Type of device use was 53 patients with dry powder inhaler, 44 patients with metered dose inhaler and 3 patients with MDI with spacer.

Table 1: Response to checklist proforma

		Frequency	Percent
DPI	Correct	8	15.1
	Incorrect	45	84.9
MDI	Correct	5	11.4
	Incorrect	39	88.6

Out of 53 patients receiving DPIs, 8 patients could perform all the steps correctly and 45 patients had one or more error during the inhaler

technique. The most common error seen among the patients was step 5 seen in 25 patients. Next common error was the step 8 seen in 13 patients, 4 patients were unable to exhale away from the mouthpiece and 3 patients were unable to inhale powder forcefully and deeply.

In patients receiving the MDIs, out of 44 patients, 5 demonstrated correct all steps of inhaler usage. 39 patients had the error in one or more steps of inhalation technique using inhalers. Most common error documented was in step 7 seen in 23 patients, 15 patients had error in the step 3. 1 patient did not remove the cap before canister and were unable to hold the inhaler in the upright position. Among 3 patients using MDI with spacer, 1 used correctly while 2 patients made mistake in the step.

Discussion:

The present study was designed to assess the use of different types of inhaler devices and the mistakes or errors patients are making using the use of such devices. The present study found that total 14 patients could perform all the steps correctly during the use of inhalers. It was seen that 86 patients were unable to use the inhalers properly. In patients using DPIs, 8 patients could perform all the steps correctly and 45 patients had one or more error during the inhaler technique. In patients receiving the MDIs, only 5 demonstrated correct all steps of inhaler usage. 39 patients had the error in one or more steps of inhalation technique using inhalers.

These results are consistent with previous studies. Souza ML et al conducted a survey of 120 volunteers. They found that only two with asthma and five with COPD performed all steps correctly when using the inhaler. 113 patients (94.2%) made at least one error when using the inhaler. Another study of 4,078 asthma patients found that 71% had difficulty using MDIs, and misuse was associated with poorly controlled asthma.

An observational study of 140 asthma patients showed that most patients misused their inhalers, whether MDIs or DPIs. Only 22.1% of his MDI users and 37.3% of his DPI users were shown to be able to complete all steps of the various techniques. Approximately 26.2% of MDI and DPI users completed the nine steps without error. In the Netherlands study by Beerendonk V et al., only 11.1% of patients performed the required procedures. One author group showed that 32% of his 106 asthma patients surveyed performed all procedures of inhalation techniques.

Similar to present study, Inhaler practises were examined among asthma patients in Nigeria, and researchers discovered that step 7 (continue to inhale until the lungs are full) and step 6 (Trigger the inhaler while inhaling deeply and slowly) were the most often missed steps. The most frequent mistake among patients utilising DPIs, according to the current study, was 50 patients' (47.1%) failure to exhale to residual volume before inhaling in step 5 similar to study by Sodi KM et al. In a study by Sodi KM et al., had only 5 patients who used metered dose inhalers with spacers. The use of spaced metered dose inhalers has been found to help improve hand-lung coordination. The reason why few patients use spacers is the increased economic cost to the patient, or the lack of spacers. Poor inhalation technique leads to poor drug response, leading to prescribing more or additional drugs, increased potential for side effects, and increased costs

Conclusion:

This study discovered a significant rate of improper inhaler use in this region. This issue must be addressed in order to ensure proper use among patients for better medicine delivery through aerosols and disease management. According to the findings of this study, the vast majority of patients use their inhaler devices incorrectly. Proper inhaler education is critical for optimal treatment with these inhaler devices.

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REFERENCE:

1. WHO. Chronic obstructive pulmonary disease (COPD) [Internet]. Geneva; 2023. Available from: [https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-\(copd\)#:~:text=Chronic obstructive pulmonary disease \(COPD\) is the third leading cause,-income countries \(LMIC\),&text=Tobacco smoking accounts for over,cases in high-income countries.](https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd)#:~:text=Chronic obstructive pulmonary disease (COPD) is the third leading cause,-income countries (LMIC),&text=Tobacco smoking accounts for over,cases in high-income countries.)
2. Singh D, Agusti A, Anzueto A, Barnes PJ, Bourbeau J, Celli BR, et al. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease: the GOLD science committee report 2019. *Eur Respir J*. 2019;53(5):11–22.

3. Becker AB, Abrams EM. Asthma guidelines: the Global Initiative for Asthma in relation to national guidelines. *Curr Opin Allergy Clin Immunol*. 2017;17(2):99–103.
4. Yadav A, Mala M. A Correlative Study of Serum Adenosine Deaminase, Malondialdehyde, Advanced Oxidation Protein Products and Spirometric Analysis in Smokers. *Int J Adv Res*. 2020;8(02):33–40.
5. Yadav A, Mala M, Golla NKL, Golla AM, Karewad K. Role of small dense LDL-cholesterol in detecting the risk of cardiovascular disease among smokers. *Int J Clin Biochem Res*. 2022;9(1):76–8.
6. Yadav A, Pyadala N, Mala RD, Mala M. Oxidative stress related organ damage assessed using the serum Ischemia Modified albumin levels and Malondialdehyde among male cigarette smokers. *IOSR J Dent Med Sci*. 2022;21(2):53–7.
7. Yadav A, Mala M, Yadav GAM, Kumar LN. Effect of Cigarette Smoking on Blood Levels of Lipid and Atherogenic Lipid Ratios. *Natl J Lab Med*. 2020;9(2):1–3.
8. Gandevia B. Historical review of the use of parasympatholytic agents in the treatment of respiratory disorders. *Postgrad Med J*. 1975;51(7 SUPPL):13–20.
9. Camps PWL. A note on the inhalation treatment of asthma. *Guy's Hosp Rep*. 1929;79:496–8.
10. Laube BL, Janssens HM, de Jongh FHC, Devadason SG, Dhand R, Diot P, et al. What the pulmonary specialist should know about the new inhalation therapies. *Eur Respiratory Soc*; 2011.
11. Diamond SA, Chapman KR. The impact of nationally coordinated pharmacy-based asthma education intervention. *Can Respir J*. 2001;8(4):261–5.
12. Molimard M, Raheison C, Lignot S, Depont F, Abouelkhatib A, Moore N. Assessment of handling of inhaler devices in real life: an observational study in 3811 patients in primary care. *J Aerosol Med*. 2003;16(3):249–54.
13. 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). *Pediatr Pulmonol*. 1994;18(2):77–80.
14. Pedersen S, Frost L, Armfred T. Errors in inhalation technique and efficiency in inhaler use in asthmatic children. *Allergy*. 1986;41(2):118–24.
15. Souza ML de M, Meneghini AC, Vianna EO, Borges MC. Knowledge of and technique for using inhalation devices among asthma patients and COPD patients. *J Bras Pneumol*. 2009;35:824–31.
16. Giraud V, Roche N. Misuse of corticosteroid metered-dose inhaler is associated with decreased asthma stability. *Eur Respir J*. 2002;19(2):246–51.
17. Onyedum CC, Desalu OO, Nwosu NI, Chukwuka CJ, Ukwaja KN, Ezeudo C. Evaluation of inhaler techniques among asthma patients seen in Nigeria: An observational cross sectional study. *Ann Med Health Sci Res*. 2014;4(1):67–73.
18. van Beerendonk I, Mesters I, Mudde AN, Tan TD. Assessment of the inhalation technique in outpatients with asthma or chronic obstructive pulmonary disease using a metered-dose inhaler or dry powder device. *J Asthma*. 1998;35(3):273–9.
19. Adeyeye OO, Onadeko BO. Understanding medication and use of drug delivery device by asthmatic in Lagos. *West Afr J Med*. 2008;27(3):155–9.
20. Sodhi MK. Incorrect inhaler techniques in Western India: still a common problem. *Int J Res Med Sci*. 2017;5(8):3461–7.
21. Hindle M, Chrystyn H. Relative bioavailability of salbutamol to the lung following inhalation using metered dose inhalation methods and spacer devices. *Thorax*. 1994;49(6):549–53.