

ASSESSMENT OF INHALER TECHNIQUE OF PATIENTS ADMITTED WITH ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE AT PULMONOLOGY UNIT KHYBER TEACHING HOSPITAL, PESHAWAR

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ABSTRACT

Objective: To assess the inhaler technique of patients admitted with acute exacerbation of Chronic Obstructive Pulmonary Disease.

Patients and Methods: This was a descriptive, cross sectional study conducted at Pulmonology Unit Khyber Teaching Hospital, Peshawar from October 2009 to October 2010. All patients who were admitted with acute exacerbation of COPD were recruited for assessment of inhaler technique. Demographic characteristics of patients were recorded and inhaler technique was assessed after stabilization, using a 6 point scale for metered dose inhaler alone (MDI) alone, MDI with a spacer device and dry powder inhaler (DPI) and was labeled as good (no mistake), poor (1-3 mistakes) and incorrect (>3 mistakes). The data was entered into a structured proforma. Mean, median, mode and standard deviation of age, percentages of sex and inhaler technique assessment for MDI, MDI with spacer and DPI were calculated using SPSS-16.

Results: The mean age of patients was 62 (\pm 9.32 SD) years, male to female ratio of 1:1.35 and the mean duration of COPD was 8.81 (\pm 5.72 SD) years. Of total 151 patients, 65 who were prescribed metered dose inhaler (MDI), 61.53% had incorrect technique, 26.15% had poor technique while only 12.3% had good technique. Similarly, metered dose inhaler with spacer device was prescribed to 90 patients; the technique was incorrect in 6.6%, poor in 53.3% and good in 40% patients. Dry powder inhaler was prescribed to 25 patients; the corresponding values were 4.34%, 34.78% and 60.86% respectively.

Conclusion: Majority of the patients with acute exacerbation of COPD had inadequate inhaler technique, and failure to address this issue may lead to avoidable hospitalizations and unnecessary escalation of the therapy.

Key Words: COPD; Exacerbation; Inhaler technique.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a chronic respiratory disorder common particularly among cigarette smokers. It is slowly progressive in nature and characterized by partially reversible airflow limitation with some extra-pulmonary manifestations.¹ It is the 4th most common cause of death worldwide and is expected to be the 3rd one by the year 2020.²

Inhaled bronchodilators and steroids are required for the treatment of COPD because of their capacity to alleviate symptoms, improve the airflow, decrease the rate of exacerbations and improve the quality of life.^{3,4} It has been estimated that only about 10 percent of the inhaled dose reaches the lungs, although this varies from 10 to 30 percent depending on the preparation and delivery device.⁵ In order to obtain maximum clinical benefits and reduce the side effects, it is important that the inhaled drugs reach the small airways.⁶

There have been many delivery systems developed for inhaled medications, each with advantages

and disadvantages. Among these, the two most frequently used devices are the dry powder inhalers (DPI) and pressurized metered dose inhaler (MDI) with or without spacer devices. Large systematic reviews of bioequivalence have found that, when properly used, MDI and DPI devices are no different in delivering inhaled Medications.⁷

For inhalers to be effective, good inhalation technique (specific steps) and adequate adherence are important.⁸ The main problem with inhalers is incorrect use which may adversely affect the benefits to be gained from inhalation therapy of COPD patients⁹. This non-compliance results in increased rates of morbidity, healthcare expenditures, hospitalizations and possibly mortality, as well as unnecessary escalation of therapy.¹⁰ In addition, incorrect inhalation technique may also increase the risk of local or systemic side effects and thereby reduce the safety and tolerability of inhaled medications.¹¹

The magnitude of this problem has been well documented. In one study, only 25 percent of inhalation techniques met all criteria for acceptability¹². Another study from Turkey showed that 41.5% of patients were using their inhaler therapy insufficiently or in overdoses.¹³ The situation in Pakistan may be even worse as all

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adequate technique questions were answered correctly by only 25% of doctors in one study.¹⁴ This project was designed to assess the inhaler technique of patients who were admitted with acute exacerbation of chronic obstructive pulmonary disease.

Objective: To assess the inhaler technique of patients admitted with acute exacerbation of chronic obstructive pulmonary disease.

MATERIAL AND METHODS

This was a descriptive cross sectional study conducted at Pulmonology Unit Khyber Teaching Hospital, Peshawar from October 2009 to October 2010. All patients with COPD exacerbation (according to the criteria of Pakistan chest society), both males and females, >40 years of age who were using MDI (metered dose inhaler) or MDI with spacer and/or DPI (dry powder inhaler) and got admitted via casualty or OPD to Pulmonology unit khyber teaching hospital, Peshawar were included. Patients with COPD exacerbation included earlier on previous admission (to control bias by avoiding interviewing the same patient repeatedly), unable to perform the inhaler maneuver, and COPD patients with pneumothorax, cardiac arrhythmia and pulmonary edema were excluded. The purpose of the study was explained and informed consent was taken. Demographic characteristics were recorded and inhaler technique was checked after stabilization of these patients. Inhaler technique for MDI (metered dose inhaler) alone, MDI with spacer or dry powder inhaler (DPI) was assessed with inhaler-specific checklist of six parameters and was labeled as incorrect (more than three mistakes), poor (one to three mistakes) and good inhaler technique (no mistake).

The points considered necessary for using MDI were: shaking the inhaler before use, removal of the cap from the inhaler, breathing out away from inhaler, holding the inhaler tightly in mouth, inhalation in synchrony with actuation of canister and holding breath for up to ten seconds.

Similarly, shaking the inhaler before use, removing the cap of inhaler, fitting the inhaler in spacer, holding the mouthpiece of the spacer tightly in mouth, pressing the canister and taking 5 breaths in and out or at least 2 deep breaths were the points necessary for using metered dose inhaler with spacer device.

For DPI (rotahaler) the 6 important points were: removal of the rotahaler from its cover, loading a dose of medicine (putting capsule inside the rotahaler and turning it), breathing out away from the inhaler, holding the inhaler tightly in mouth, inhaling very deep and fast, removing the DPI from mouth and holding breath for up to 10 seconds.

All data was entered in an objectively structured proforma. Data collected was entered into SPSS-16 for statistical analysis. Mean, median, mode and standard

deviation of age, FEV1 (Forced Expiratory Volume in 1st second) and duration (years) of COPD; percentages of sex and inhaler technique assessment were calculated. Results were shown as tables/graphs.

RESULTS

A total of 151 patients with mean age of 62(± 9.32 SD) years and male to female ratio of 1:1.35 were included for inhaler technique assessment. The mean duration of COPD was 8.8(± 5.72 SD) years as shown in Table 1. All the patients had moderate to very severe disease with mean FEV1 =37.9(± 18.20 SD) % predicted shown in Table 2.

Among the patients, who were prescribed metered dose inhaler (MDI), 65 in number, 61.53% had incorrect technique, 26.15% had poor technique while only 12.3% had good technique as assessed by six points scale (Figure 1). Similarly, metered dose inhaler

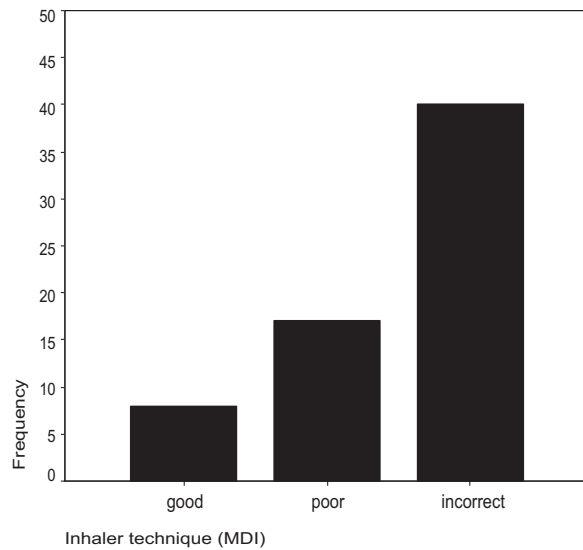


Figure 1: Inhaler technique assessment of patients using Metered Dose Inhaler (MDI)

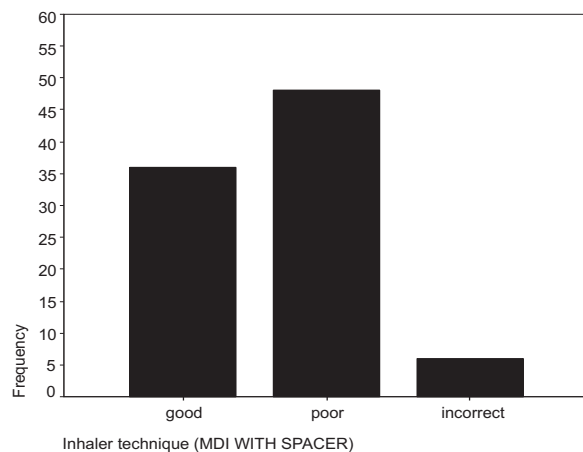


Figure 2: Inhaler technique assessment of patients using Metered dose inhaler with a Spacer device

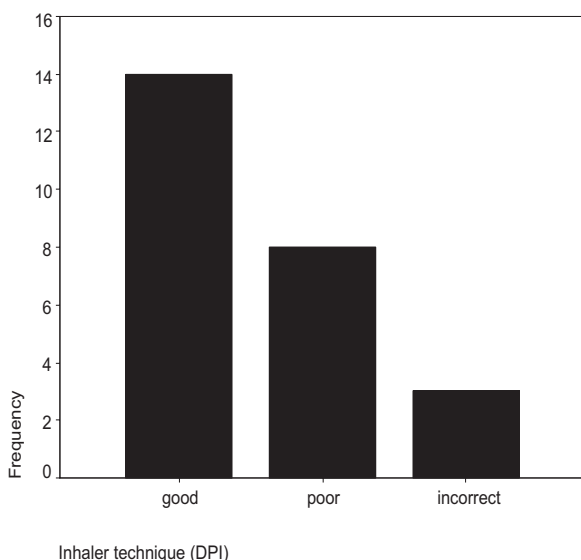


Figure 3: Inhaler technique assessment of patients using Dry Powder Inhalers (DPI).

Table 1: Mean, median, mode and standard deviation of the duration (years) of COPD in patients with acute exacerbation

Statistical test	Duration of COPD in years
Mean	8.81
Median	7.00
Mode	8.00
Standard deviation	5.72

Table 2: Mean, median, mode and standard deviation of fev₁ (1% predicted) in patients with COPD exacerbation

Statistical test	FEV ₁ (% Predicted)
Mean	37.85
Median	33.00
Mode	28.00
Standard deviation	18.24

with spacer device was prescribed to 90 patients; the technique was incorrect in 6.6%, poor in 53.3% and good in 40% patients (Figure 2). Dry powder inhaler was prescribed to 25 patients; the corresponding values were 4.34%, 34.78% and 60.86% respectively as shown in figure 03.

DISCUSSION

Metered dose inhaler (MDI) was prescribed to 65 patients, the technique was good (no mistake) in only 12.3% patients. Majority (87.69%) of the patients made at least one mistake while using metered dose inhaler. These findings are close to 76% found by Vander et al.¹⁵ and 90% found by Restrepo et al.¹⁶ But this is in contrast to 43% found by Gracia et al (EFRAM study).¹⁷ The

difference could partly be due to the fact that females make more mistakes¹⁸ who constituted 57% of our study population (90% illiterate) as compared to 8% in EFRAM study. In addition, local studies also support the higher rate of incorrect inhaler technique. For example, only 24% patients with chronic lung diseases using inhalers could perform all steps correctly.¹⁹

Metered dose inhaler with spacer device was prescribed to 90 patients; the technique was good in 40% patients. Dry powder inhaler was prescribed to 25 patients; the technique was good in 60.86% of these patients. These values are close to the results of an Indian study showing the corresponding values as 45.62% and 34.61% respectively.²⁰ In addition, this improvement may be due to the fact that inhalation in synchrony with actuation of the inhaler is the commonest mistake in patients using MDI alone which can be avoided by using a spacer device²¹. Overall, the inhaler technique was poor in all the three groups; ranging from 39% to 87.7%. In summary, all studies show a moderate to high prevalence of poor inhaler technique in patients with COPD exacerbation. This emphasizes the need for teaching inhaler maneuver in management of COPD and preventing its exacerbations. In addition, MDI with spacer devices should be used frequently to overcome the difficulty of inhalation in synchrony with actuation of the metered dose inhaler.

CONCLUSION

Majority of the patients with acute exacerbation of COPD had poor inhaler technique, and failure to address this issue may lead to avoidable hospitalizations and unnecessary escalation of the therapy.

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