



Original Research Article

Evaluation of Inhaler Techniques among Bronchial Asthma Patients Attending a Tertiary Care Hospital in India

Shivaraj. B. Patil^{*1}, Sachin Patil^{*2}, Vikas Joshi^{*3}, Rajat Mishra^{*1}, Pradeep J^{*1}, Prashant Dass^{*1}

^{*}Post Graduate Resident,

¹Department of Pharmacology, ²Department of Medicine, M.R. Medical College, Gulbarga.

³Department of Anaesthesiology, Father Muller Medical College, Mangalore.

Corresponding Author: Shivaraj. B. Patil

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ABSTRACT

Background: Inhaled bronchodilator therapy is often used in the treatment asthma. When the technique of inhalation is poor, the drugs are often not delivered appropriately to the site of action leading to poor treatment outcomes. Therefore this study was undertaken to evaluate the use of inhaler technique among asthma patients in India.

Materials and methods: 108 asthma patients using inhaler device who consented for the study were recruited and their demographic data, education, history of asthma and treatment were recorded. Thereafter, an inhaler administration checklist was then used by the investigators to assess the technique of use of the inhalers.

Results: Out of 108 asthma patients, 58 were males. 31 patients used dry powder inhaler (DPI) and 77 patients used pressurized metered dose inhalers (pMDI). Only 17 (22.1%) patients using pMDI and 13 (41.9%) patients using DPI completed all the steps of their respective inhaler technique. Patients with higher educational status are more likely to use the inhalers more accurately. Most common error in the use of pMDI was step 6 (Trigger the inhaler while breathing in deeply and slowly). For DPI the most common error was step 6 (Inhale deeply and forcefully).

Conclusion: This study showed that majority of asthma patients used their inhalers inaccurately. There is need for increased awareness among all the health- care personnel involved in asthma care to ensure that the asthma patients know correct inhaler technique.

Keywords: Pressurized metered dose inhaler, DPI, Inhaler device

INTRODUCTION

Bronchial asthma is estimated to affect some 300 million people worldwide and accounts for about one per cent of all disability-adjusted life years lost. [1] Inhaled bronchodilator therapy is often used in the treatment of both chronic obstructive airways disease (COAD) and asthma. [2] The pressurized metered dose and the DPI

devices are the preferred pulmonary drugs delivery methods as the patients are able to use them on their own with minimal assistance if they are taught well. [3]

About 90% of patients show incorrect technique with either standard pressurized metered dose inhalers (pMDIs) [4] or dry-powder inhalers (DPIs). Although, these are designed to improve use, still

significant rates of incorrect use among COPD and asthma patients. [5-8] When the technique of inhalation is poor, the drugs are often not delivered appropriately to the site of action leading to poor treatment outcomes. Poor inhalation technique leads to insufficient medication effects [9] and this problem obviously has cost implications, both in terms of medication, visits to the GP, and hospital admissions. [10]

Patients require appropriate education in the correct handling of inhaled medications. Undoubtedly, the prescribing physician bears the primary responsibility for this task. [11] In recent years, pharmacists have become more active in patient care, and can demonstrate a positive impact on the outcomes of drug therapy in asthma patients, globally. [12]

Literature review shows that there is a paucity of data on studies evaluating the correct use of inhaler techniques among asthma patients in India and Asia in general, hence the need for such a study. Therefore this study was undertaken with an aim to evaluate the use of inhaler technique among asthma patients in a developing country like India.

MATERIALS AND METHODS

This was an observational cross sectional study conducted on asthma patients using inhaler devices (pMDI or DPI) attending medicine outpatient department of Mahadevappa Rampure Medical College, Gulbarga, India during March to October 2014. Only those patients who consented for the study were recruited and their demographic data, education, history of asthma and treatment were recorded. Thereafter, an inhaler administration checklist [3] was then used by the investigators to assess the technique of use of the inhalers. The checklist was ticked, while the patient was observed using the inhaler medications. Patients were

subsequently educated on how best to use the medications if mistakes were identified. For the pMDI, a checklist comprising nine steps was used and they are: [3]

1. Take the cap off the inhaler mouthpiece
2. Shake the inhaler
3. Hold the inhaler upright
4. Breathe out
5. Place the inhaler mouthpiece between the lips and the teeth; keep the tongue from obstructing the mouthpiece
6. Trigger the inhaler while breathing in deeply and slowly
7. Continue to inhale until the lungs are full
8. Hold the breath while counting to 10
9. Breathe out slowly.

For DPI, following checklist was used:

1. Open the device
2. Slide the lever away until it clicks
3. Keep device level while inhaling
4. Exhale deeply, away from the mouthpiece
5. Put mouthpiece between teeth and close lips around
6. Inhale deeply and forcefully
7. Hold breath for 10 s
8. Remove Inhaler from the mouth without exhaling into it
9. Breathe out slowly.

Ethical approval:

Prior ethics committee approval from the Institutional Ethics Committee of Mahadevappa Rampure Medical College, Gulbarga was obtained.

Statistical analysis:

Data obtained was analysed using Graph pad prism 5. Pearson's Chi-square test was used to determine the significance. $P < 0.05$ was considered significant.

RESULTS

Among 108 participants, 58 were males and 50 females. 31 patients were using DPI and 77 patients were using pMDI. Most of the patients were in the age group of 61-70 years. Majority 54% of asthma patients had completed primary education.

Most of the patients got the instructions about inhaler technique from the doctors. Only 17 (22.1%) patients using pMDI and 13 (41.9%) patients using DPI completed all the steps of their respective inhaler technique. The detailed results are presented in the following figures and tables.

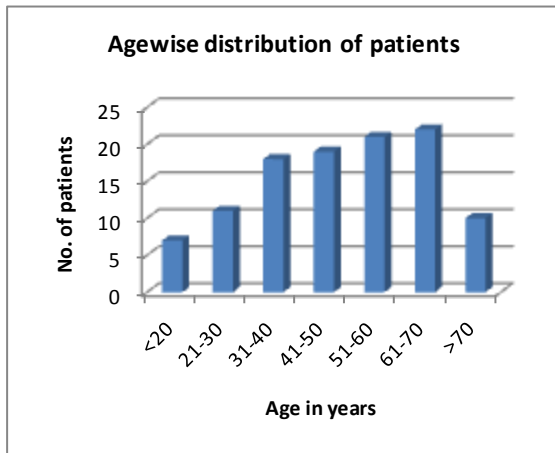


Figure 1

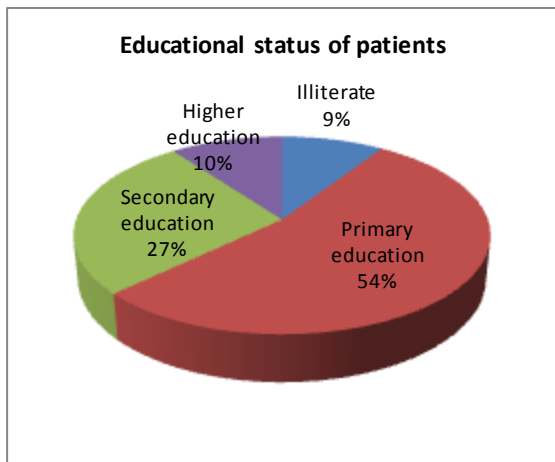


Figure 2

Table 1: Distribution of all patients who performed inhaler technique correctly according to their educational status

Educational status	Patients who performed inhaler technique correctly	
	pMDI	DPI
Illiterate	2	1
Primary education	6	3
Secondary education	7	3
Higher education	7	5

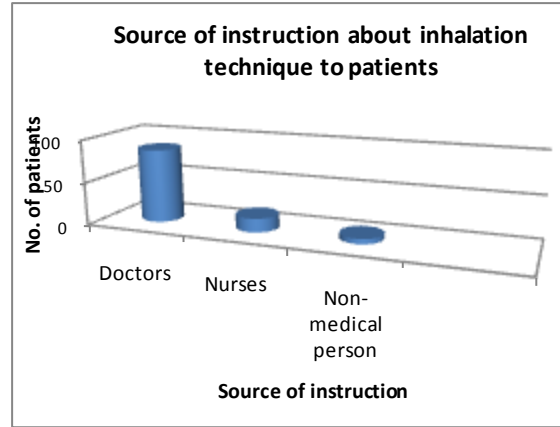


Figure 3

Table 2: Patients who completed inhaler technique correctly

Inhaler device	Complete inhaler technique N (%)	Incomplete inhaler technique N (%)	Total	P value
pMDI	17(22.1)	60(77.9)	77	0.04
DPI	13(41.9)	18(58.1)	31	

* χ^2 value is 4.344

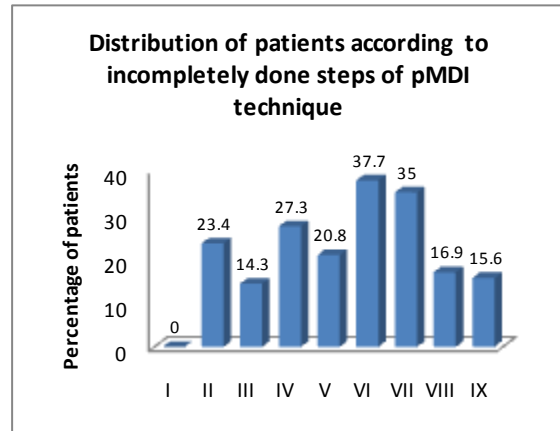


Figure 4

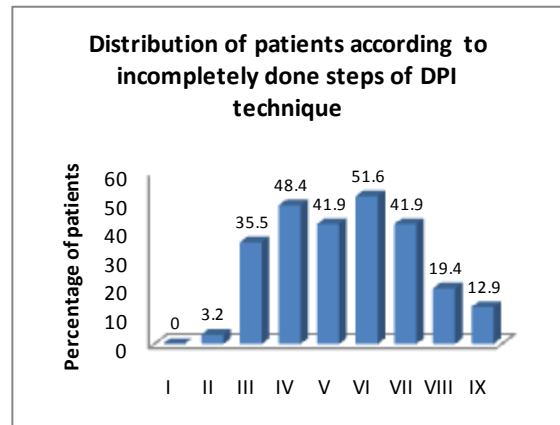


Figure 5

DISCUSSION

Out of 108 asthma patients, many of them used their inhalers incorrectly whether it is pMDI or DPI. This study also noted that patient related factors like educational status affected the completion of steps of inhaler technique.

Only 22.1% of pMDI users and 41.9% of DPI users were able to complete all the steps in their different inhaler technique. In a study by van Beerendonk *et al.* in the Netherlands, [13] only 11.1% patients completed the required steps, which is very less compared to our study. Our observations were consistent with that of Onyedum CC *et al.* in Nigeria, [14] 22.1% of pMDI users and 37.3% of DPI users completed all the steps in their study.

It was noted that significantly more DPI users followed the correct sequence of steps required during inhalation than do pMDI users. The type of inhalator device is an important determinant of incorrect inhalation technique with most previous studies showing that DPI users were able to complete the steps better than pMDI users. [9,15] This is probably because pMDI device requires hand-breath coordination unlike DPI.

The educational status of the patients affected completion of both the inhaler technique steps. Less number of patients who were illiterate or with primary education completed the steps of inhaler technique than did those with secondary and higher education. This is comparable to what was noted in an earlier study where poor inhaler technique was associated with less education. [11]

In our study the most common errors in the use of pMDI were step 6 (Trigger the inhaler while breathing in deeply and slowly), followed by step 7 (Continue to inhale until the lungs are full). For DPI the most common errors were step 6 (Inhale deeply and forcefully) followed by step 4

(Exhale deeply, away from the mouthpiece). These findings are consistent with those of van Beerendonk *et al.*, [13] who identified steps 7 and 4 as the most common “skill” and “non-skill” mistakes respectively. Similarly, other studies identified our steps 7 and 6 as the most common mistake made by patients using a pMDI. [9,16,17] Indeed the most important aspect of inhalation technique in pMDI is a slow (<60 L/min) and deep inhalation. [18]

This study however has some limitations; the small number of subjects studied may have affected some of the conclusions drawn from this study.

Equally, it was not possible to ascertain whether the inhaler technique, which patients had been taught by health practitioners prior to this study, was correct. Hence the impact of previous teaching of inhaler technique to patients was not assessed properly. The assumption that inhaler technique taught by any doctor or other healthcare providers must be correct may not be true as studies have shown that healthcare providers may not know how to use inhalers correctly. [19,20] This could form basis of future research which will assess the knowledge of the inhaler techniques among healthcare providers who actually teach the patients how to use the inhalers.

Furthermore, some other significant determinants of an incorrect inhaler technique were not assessed in this study and include low score in mini mental state examination, poor hand grip strength [21] bronchodilator unresponsiveness, lack of patients’ perception of importance of inhaler use and low emotional quality of life. [16]

In spite of the limitations, this study has been able to assess inhaler techniques among selected asthma patients seen in a developing nation like India and will no doubt add to the body of literature in this area of practice. It will equally form bases of continued education of the patients who use

these inhalers during their routine clinic visits.

CONCLUSION

This study showed that majority of asthma patients used their inhalers inaccurately. There is need for increased awareness among all the healthcare personnel involved in asthma care to ensure that the asthma patients know correct inhaler technique. These patients should also be asked to demonstrate the inhaler technique during their regular follow up and teach them the correct inhaler technique if their inhaler technique is poor.

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