

Original Article

Faulty Technique of Inhaler Use among Patients with Uncontrolled Asthma Presenting to A Tertiary Care Hospital

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Abstract

Objective: To determine the frequency of faulty technique of inhaler use and the factors associated with it in uncontrolled asthmatic patients presenting to a tertiary care hospital.

Methods: A cross-sectional study was carried out at Arif Memorial Teaching Hospital, Lahore, from 23-07-2023 to 23-02-2024. Data was gathered utilizing consecutive sampling. A total of 100 patients with uncontrolled asthma presenting to Arif Memorial Teaching Hospital Lahore and satisfying the selection criteria were taken. Demographic information was noted on the pro forma. All the patients were asked to demonstrate use of inhaler and were assessed for proper technique according to the checklist.

Results: In the present study, there was a total of 100 cases out of which 61 (61.0%) were males and 39 (39.0%) were females. The mean age of the participants was 31.37±6.67 years. Faulty technique was seen in 48 (48.0%) of the cases. No significant difference was observed in terms of gender; however, it was seen more in females (51.28%), p= 0.89. This faulty technique was more in cases with age group 15 to 39 years where it was seen in 52.63% of the cases, p= 0.09. Faulty technique was high in cases with metered-dose inhaler type of inhalers as compared to metered-dose inhaler + spacer; 66.67% vs 11.76%, p < 0.001. This difference was also significant in cases that had no schooling (92.59%), p= 0.01. Family income less than 10,000 per month was also associated with high number of cases with faulty technique (86.36%), p= 0.01.

Conclusion: Faulty technique is observed in approximately half of the cases and this difference is statistically significant in cases that had metered-dose inhaler type of inhaler usage, have no schooling and monthly income less than 10,000 per month

Keywords: Bronchial Asthma, Technique of Inhaler use, Metered-Dose Inhaler, Spacer

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Introduction

Asthma is a chronic inflammatory condition of the air passages linked with hyper-reactivity of bronchi and reversible hindrance of flow of air into the lungs.¹ Approximately 300 million individuals have been affected by asthma all around the globe, and this number is likely to increase to 100 million more by 2025.² The overall prevalence of asthma is 8.41% in the United States.³ It is manifested as repeated episodes of dyspnea, chest tightness, wheezing and cough following exposure to the allergic stimuli⁴. Symptomatic control is the principal

objective in the treatment of asthma, along with reduced visits to emergency departments for the management of exacerbations of asthma and improved quality of life.⁵

Inhalation of drugs is the crucial and most frequently used method of drug administration in managing asthmatic patients. This route of drug delivery is beneficial because of the localized administration of a high dose of medicine directly into the airways, causing least systematic side effects.⁶ The common ways of administering these medicines are through pressurized metered dose inhalers (pMDI), pMDI with spacers, dry powder

inhalers (DPI), or with nebulizers. MDI and DPI devices are the favored medicine administration techniques as the patients can use them by themselves with least help needed, especially if they are properly educated⁷. However, faulty inhaler technique is the most prevalent reason of uncontrolled asthma.⁸ Faulty technique of inhaler use in managing asthma reduces direct delivery of medicine, compliance of patients to drug and its efficacy, ultimately leading to uncontrolled asthma and increased morbidity and mortality.⁹ Therefore, the rationale of the current study was to assess the frequency of faulty technique of inhaler use and the factors associated with it in uncontrolled asthmatic patients presenting to a tertiary care hospital to decrease the episodes of acute asthma and enhance the quality of life of patients.

Methods

A cross-sectional study was carried out at Arif Memorial Teaching Hospital, Lahore, from 23-07-2023 to 23-02-2024. Data was taken utilizing consecutive sampling. A sample size of 100 cases was calculated with 95% confidence level, 10% margin of error and taking expected percentage of faulty technique of inhaler used as 45%¹⁰. This study was approved by the Institutional Review Board and informed consent was taken from participants prior to data collection.

Inclusion criteria:

- Adult patients aged more than 18 years, of either gender.
- Patients with uncontrolled asthma receiving inhaled anti-asthmatic medication from the last three months.

Exclusion criteria:

- Patients without a documented diagnosis of bronchial asthma.
- Those who were not prescribed inhaled anti-asthmatic drugs according to their medical records.
- Patients with other lung conditions.

100 patients were included in the study after taking informed consent. Their demographic information was noted down. All the patients were asked to demonstrate use of inhaler and were assessed for proper technique according to the checklist¹⁰. All data was collected on the pre-structured questionnaire. SPSS version 24 was utilized to analyze the gathered data. Qualitative variables were presented as frequency and percentage, whereas quantitative variables as mean and standard deviation. Chi-square test was administered to assess the association between socio-demographic variables, device type, and faulty inhaler technique.

Table 1: Baseline characteristics of the patients (n=100)

Parameters	Frequency	Percentage
Age of patients* (years)	31.37±6.67	
Gender of patients		
Male	61	61.0
Female	39	39.0
Faulty Techniques		
Yes	48	48%
No	52	52%

n = number of patients; * = mean ± standard deviation was use to demonstrate the data.

Results

A total of 100 patients were included in the study. Baseline characteristics of patients are shown in table 1. The mean age of the participants was 31.37±6.67 years. There were 61(61%) males and 39(39%) females. Faulty technique of inhaler use was observed in 48(48.0%) cases, as demonstrated in figure 1.

There was no significant difference in terms of gender; however, it was more seen in females (51.28%) with p=0.89. This faulty technique was more in cases with age group 15 to 39 years where it was seen in 52.63% of the cases with a p-value of 0.09. The faulty technique was highly significant in cases with MDI type of inhalers as compared to MDI + spacer where it was seen in 66.67% vs 11.76%, p=0.001. This difference was also significant

Table 2: Association of socio-demographic variables, device type, and faulty inhaler technique (n=100)

Parameters	Faulty technique		P-value*
	N (%)		
	Yes	No	
Device type			
pMDI	44 (66.67)	22 (33.33)	0.001
pMDI + Spacer	4 (11.76)	30 (88.24)	
Family income (rupees)			
<10,000	19 (83.36)	3 (13.64)	0.01
≥10,000	29 (37.18)	49 (62.82)	

n = number of patients; % = percentage of patients; pMDI =pressurized metered dose inhaler; * = chi-square test was used to find out p-value and p ≤ 0.05 was taken as significant.

in cases that had no schooling where this was observed in 25 (92.59%) of the cases, p=0.01. Family income less than 10,000 per month was also associated with a high number of cases with faulty technique, seen in 19 (86.36%) of cases, p=0.01.

Discussion

Inhaler devices are used to administer the anti-asthmatic drugs in bronchial asthma patients and their efficacy can be altered by many factors.¹¹ The correct dose of medicine reaching the lungs is crucial to enhance drug effectiveness in asthmatic management,¹² and this chiefly relies on the inhaler type, inhalation technique, and patients' compliance.¹³ Uncontrolled asthma is mainly caused by improper inhaler technique in up to 90% of the cases¹⁴⁻¹⁶. Appropriate inhaler technique is associated with improved disease outcome and quality of life of sufferers.^{15,17} This study was carried out to assess the faulty technique of inhaler use and the factors associated with it to avoid asthma exacerbations, reduce morbidity and mortality, and improve quality of life in the local population.

Previous literature has shown a relationship between inappropriate inhaler use and poor asthma control with substantial percentages of uncontrolled asthma in patients with faulty inhaler techniques.¹⁸ The results in the past are widely variable and have been seen from 12% to 88% of the cases.^{14,15} In the present study, the Faulty technique was seen in 48 (48%) out of 100 cases. The difference across the globe can be explained by the fact of different types of inhaler usage, education difference, and also the protocols used by the examiner to assess authenticity.

There was no significant difference in terms of gender; however, it was more seen in females (51.28%), with $p=0.89$. In the past, it was also proved that the females are usually more associated with poor technique; how-

ever, no significant difference was found ($p=0.906$), yet female predominance was not denied.¹⁰ In a study done by Ganguly A et al, the females were seen to be associated with the error in 62.1% of cases as compared to 47.2% males, p -value = 0.31²⁸. The faulty technique was highly significant in cases with MDI type of inhalers as compared to MDI+spacer where it was seen in 66.67% vs 11.76% with a p -value of 0.001. This was also seen in the previous studies that in cases with better device control, the usage technique was better as compared to meter dose inhalers i.e. MDI + spacer. According to a study done by Jahedi L et al it was seen that the correct use of meter dose inhalers (MDI) was seen in 9.1% of the cases and 91.9% had a poor technique.¹⁵ As compared to those using MDI + spacer this accuracy was seen in 33.3% and faulty technique in 66.7 of the cases which are still very high as compared to the present study.¹⁵ There were few limitations of this study as this study did not look for other types of inhalers like dry powder inhalers (DPI) which are also widely used at present and the study also did not elaborate on the severity of the disease at the time of presentation as it can be an important factor leading to poor concentration and a higher degree of error making in cases of acute exacerbation.

However, there were many strengthening points as well as this study highlighted a very important issue that is neglected and will bring more focus on the emphasis of better inhaler technique and lesser presentation to emergency departments and will result in lowering the cost of disease burden.

Table 3: Summary of previous literature on the frequency of faulty technique of inhaler use in bronchial asthma

Author	Year of publication	Country	Sample size	Method	Result
Melani et al. ¹⁴	2011	Italy	1664 (42% with asthma)	Cross-sectional study	12% for MDIs
Al-Jahdali et al. ¹⁰	2013	Saudi Arabia	450	Cross-sectional study	45%
Arora et al. ¹⁹	2014	India	300	Observational study	82.3%
Dalcin et al. ²⁰	2014	Brazil	268	Cross-sectional study	30.5%
Onyedum et al. ²¹	2014	Nigeria	140	Cross-sectional study	77.9%
Chogtu et al. ²²	2017	India	330	Cross-sectional study	36.6%
Jahedi et al. ¹⁵	2017	Australia	25	Mix-method study	88%
Pessôa et al. ²³	2018	Brazil	71	Cross-sectional study	60.5%
Al-Worafi ²⁴	2018	Yemen	49	Cross-sectional study	77.6%
Janežič et al. ¹⁷	2020	Slovenia	145	Cross-sectional study	70%
Dalal et al. ²⁵	2020	India	113	Cross-sectional study	64.60% (50.44% for DPIs and 14.15% for MDIs)
Haddad et al. ²⁶	2020	Jordan	150	Prospective observational study	52%
Widyastiwani et al. ²⁷	2021	Indonesia	30	Cross-sectional study	70%
Current study	2022	Pakistan	100	Cross-sectional study	48%

Conclusion

Faulty technique is observed in approximately half of the cases and this difference is statistically significant in cases that had metered-dose inhaler type of inhaler usage, have no schooling and monthly income less than 10,000 per month.

Conflict of Interest: *None*

Funding Source: *None*

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