Content available at: https://www.ipinnovative.com/open-access-journals

IP Indian Journal of Immunology and Respiratory Medicine

Journal homepage: https://www.ijirm.org/

Original Research Article

Perspective of asthma patients on inhalation devices: Scenario from Urban India

Tushar Ramesh Sahasrabudhe[1], Atulya Anand[1]*

[1]Dept. of Respiratory Medicine, Dr. D. Y. Patil Medical College, Hospital & Research Centre, Pimpri, Pune, Maharashtra, India

Abstract

Background: Inhalation devices are the cornerstone of asthma management, providing targeted drug delivery to the airways with minimal systemic effects. Despite advances in device design and patient education, incorrect inhaler technique and poor device maintenance remain widespread, impacting disease control.

Objective: To evaluate patient perspectives on inhalation devices, assess inhalation technique, device preferences, and device care practices among asthma patients in an urban Indian setting.

Materials and Methods: An observational study was conducted among 182 adult asthma patients at a tertiary care teaching hospital. Participants who received device training within past one month, were assessed using standardized inhaler technique checklists and Asthma Control Test (ACT). Device preferences and maintenance practices were inquired into.

Results: Dry powder inhalers (DPIs) were preferred by 69.8% of participants. Elderly patients preferred pressurized metered dose inhalers (pMDIs) with spacers. Technique correctness scores were 8.40 ± 0.718 for DPI and 7.99 ± 0.839 for pMDI users out of 10. Not holding breath for adequate time after inhalation and failure to rinse/ gargle remained the most notable and important errors. Patients with lower technique scores showed poorer asthma control (ACT ≤19). 57.14% of participants reported not cleaning their devices at all.

Conclusion: Despite recent training, significant technique and device care errors occurred, emphasizing the need for repeated training and reinforcement. Proper device maintenance is important to improve adherence and optimize asthma control.

Keywords: Asthma, Inhaler device, Inhaler device preference, Inhaler device maintenance, Inhaler technique.

Received: 11-07-2025; **Accepted:** 28-08-2025; **Available Online**: 30-09-2025

1. Introduction

Inhalation devices remain the primary means of pharmacological asthma management, providing targeted drug delivery to the lungs with minimal systemic exposure.[1] These devices are available as dry powdered inhalers (DPIs), pressurized metered dose inhalers (pMDIs) and nebulizers.[2] The DPIs are available as either single-dose or multi-dose devices, whereas pMDIs are by default multi-dose. A wide variety of devices in various shapes and sizes are available under different brand names, with minor design changes. In single-dose DPIs, the capsule is either broken or punctured so that the drug is released. In multi-dose DPIs, the drug is released from blisters, cartridges, or compartments on clicking. In pMDIs, the device needs to be actuated by either hand or by breath to release the drug. A spacer device is sometimes used in conjunction with a pMDI. Nebulizers are used to passively deliver the drug to the patient. These are available with various types such as jet nebulizers, mesh nebulizers, ultrasonic nebulizers, hand-held nebulizers, etc.

The clinical effectiveness of inhalational devices is often compromised by incorrect inhalational technique and sub-optimal device maintenance, which may contribute to inadequate disease control and increased healthcare utilization.[3] Some studies have shown that less than half of the patients consistently demonstrate correct inhaler technique, which has remained largely unchanged over the past four decades despite advancements in inhaler designs and education efforts.[4-6] However, very few studies have tried to look into the reasons behind the same and also the other aspects, such as device care and the factors contributing to device preference. Also, in spite of correct device demonstration, there may be some evaporation of the

*Corresponding author: Atulya Anand
Email: atulyaanand5@gmail.com

http://doi.org/10.18231/j.ijirm.12281.1875167832

imparted knowledge over time. Patient-related factors including age, literacy, socioeconomic background, device cost and device familiarity, may significantly shape inhaler technique and adherence. Patient satisfaction with their inhalation device has also been associated with compliance.[7,8]

This study explores the patient preferences of inhalation devices and the correctness of inhalation techniques using a methodical scoring system.

2. Materials and Methods

This was an observational study conducted at a tertiary care teaching hospital to evaluate the perspective of asthma patients on inhalation devices, assess inhalation technique, device preferences and device care. An approval was obtained from the Institutional Ethics Committee before the commencement of the study (IESC/257/2023). A total of 182 adult asthma patients using various inhalation devices were enrolled. Only those who had received a formal training by the treating doctor on inhaler devices in the past 1 month were included, whereas those who were trained earlier than one month, trained by technicians or those who had started using inhalation devices by reading package inserts or watching online videos were excluded. This was essential as we wanted to focus on the common errors that occur in inhalation technique, despite a very recent personal demonstration and methodical training by a physician. Patients using only nebulizers as a maintenance therapy were also excluded as no special inhalation technique is involved in the same. Prior written and informed consent was obtained from all the study participants.

After obtaining the consent, the study participants were invited in small groups (10–15 per session) on pre-decided dates. They were instructed to bring their own inhalational devices with them. On the day of the visit, the following assessments were conducted:

1. Inhalation device technique assessment, using standardized checklists tailored to the type of device used e.g., DPI, pMDI, spacer. (**Table 1**)
2. Recording of patient device preference for the devices and enquiry in to the reasons for the same
3. Assessment of device care
4. Asthma control evaluation using the Asthma Control Test (ACT) (**Table 2**)

A variety of devices were used by the participants and the device technique varied slightly for each device. Therefore, device-specific steps were also assessed in addition to the standard steps. The scores were then calculated on a uniform 10-point scale as mentioned in **Table 1**. Similarly, additional steps for MDI with a spacer were calculated on a uniform 10-point scale.

Table 1: Checklist of stepwise inhalation technique

Step No.	DPI	pMDI
1.	Unlock the device/ Insert the capsule in the device (as per the device type)	Shake the canister well.
2.	Break/ Pierce the capsules/ release the drug (as per the device specification).	Remove the cap and hold the canister upright (and not upside down). Attach the spacer properly (as per the case)
3.	Take a deep breath and exhale out all the air (but not into the device). Do not breathe in again.	Take a deep breath and exhale out all the air. Do not breathe in again.
4.	Hold the mouthpiece between the teeth and seal the lips around it.	Hold the mouthpiece between the teeth and seal the lips around it
5.	Inhale completely through the mouth with moderate speed.	Extend the neck so as to minimize the throat deposition.
6.	Remove the device from the mouth (to prevent exhalation into the DPI at a later step).	Start inhalation first and then quickly actuate (only one puff at a time). Directly start inhaling for breath-actuated devices. For spacers, first actuate and then start inhalation.
7.	Hold the breath for 5-10 seconds.	Inhale deeply with moderate speed.
8.	Inhale at least 3 times for each capsule to ensure complete emptying.	Hold the breath for 5-10 seconds.
9.	Remove the empty capsule from the device and then repeat the procedure for the next capsule (if prescribed so).	Exhale through the nose/ mouth before taking the next puff (if prescribed so).
10	Rinse the mouth and gargle with tap water immediately after inhalation.	Rinse the mouth and gargle with tap water immediately after inhalation

Table 2: Asthma control test

Questions	*Response Options*	*Score*
1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much work done at workplace, school or at home?	All of the time	1
	Most of the time	2
	Some of the time	3
	A little of the time	4
	None of the time	5
2. During the past 4 weeks, how often have you had shortness of breath?	More than once a day	1
	Once a day	2
	3 to 6 times a week	3
	Once or twice a week	4
	Not at all	5
3. During the past 4 weeks, how often did your asthma symptoms wake you up at night or earlier than usual in the morning?	3 or more times a day	1
	1 or 2 times per day	2
	2 or 3 times per week	3
	Once per week or less	4
	Not at all	5
4. During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication?	3 or more times per day	1
	1 or 2 times per day	2
	2 or 3 times per week	3
	Once a week or less	4
	Not at all	5
5. How would you rate your asthma control during the past 4 weeks?	Not controlled at all	1
	Poorly controlled	2
	Somewhat controlled	3
	Well controlled	4
	Completely controlled	5

The collected data was then grouped into 3 subgroups for device technique error analysis. The subgroups were as follows:

1. Steps involved in breaking the capsule/ actuating of device/ holding the device
2. Breath related steps (Inhalation technique)
3. Post-inhalation steps

The total number of errors was calculated for each subgroup and divided by the total number of responses for that subgroup. The percentage of error was then calculated.

Patients were asked to provide the reasons for the choice of their inhalational device and the data was recorded. Patients were also asked about the device care which was done by them and the data was recorded.

Patients were again re-educated on the correct device techniques and device care, once the assessment was done. The errors were mentioned to them individually and the correct technique was demonstrated again.

3. Results

A variety of inhalational devices were being used by the study participants. Various brands of Dry Powder Inhalers (DPIs) were in use, and many patients were also using Pressurized Metered Dose Inhalers (pMDI) with or without a spacer. The details have been summarized in **Figure 1**.

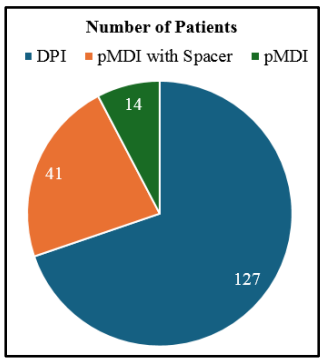

Figure 1: Various inhaler devices types used by participants

Overall, there was a patient preference for using DPIs (69.8%) over pMDIs with or without spacer (30.2%).

Most participants (71.4%) reported that their inhaler device choice was based on a recommendation by their treating doctor. 28.6% participants chose their device themselves with the help of the treating doctor. 23.6% participants had shifted their devices for a variety of reasons. These included past experience with a particular device used by them or their family members, ease of device use, cost of the device, developing oral candidiasis, freon effect, powdery feel in the throat, complexity of the inhalation technique and cognitive issues. Past experience was the most important determinant (12.1%).

56/182 and 126/182 participants were above and below the age of 50 years respectively. Very old participants reported that they needed assistance in actuating the inhaler. These participants also had difficulty in proper holding of the inhaler device as well as insertion of pMDI in the spacer and they preferred a DPI device. Some also preferred using a nebulizer during exacerbation when inhalation with either DPI or MDI was too difficult due to severe dyspnoea. pMDI with spacer was otherwise the preferred choice for participants above the age of 50 years. Few participants reported that they experienced tremors while using pMDI inhalers. This was primarily linked to the fact that they were taking much more than the required doses of the inhaler or actuating the inhaler multiple times while taking the medication. It was observed that participants below the age of 50 years preferred using DPI devices.

With reference to the inhalational device technique checklists (**Table 2**), the patients were asked to demonstrate the use of their respective inhalational devices. The errors in each step of the technique were noted. The results were as mentioned in **Figure 2**.

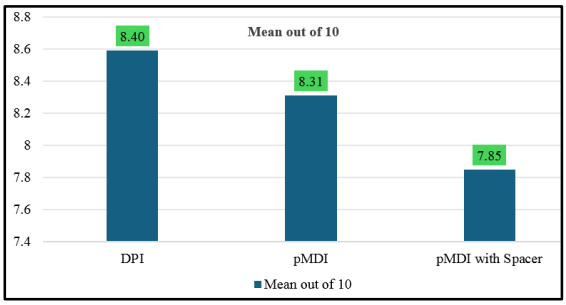

Figure 2: Inhaler device technique correctness (Mean)

The device technique for DPI varied slightly for each device. As a variety of devices were available, additional device-specific steps were assessed. Similarly, additional steps were assessed for those using pMDI with spacer. The scores were then calculated to an uniform 10-point scale.

The mean inhaler device technique score was higher among DPI users (Mean = 8.40, SD = 0.718) compared to MDI users (Mean = 7.99, SD = 0.839).

An independent samples t-test indicated that this difference was statistically significant ($t(180) = 3.35$, $p < 0.001$). However, Levene's test for equality of variances suggested that the assumption of equal variances was violated. Additionally, the Shapiro-Wilk test indicated non-normality of the data ($W = 0.898$, $p < 0.001$).

Given these violations of assumptions, a non-parametric Mann-Whitney U test was conducted as a more robust alternative. The Mann-Whitney U test also demonstrated a significant difference between groups ($U = 2378$, $p < 0.001$).These findings suggest that DPI users had significantly higher inhaler technique scores than MDI users, based on both parametric and non-parametric analyses ($p < 0.001$).

Patients with a device correctness score of 8 or above had better asthma control (ACT score more than 19 in most cases, with a mean of 21.67). In patients with a device correctness score of 7 or less, 52.1% had poorer asthma control with an ACT score of 19 or less, with a mean of 15.83) whereas 47.9% had well-controlled asthma despite inadequate inhalation technique. A Fisher's exact test demonstrated a highly significant association between inhaler device technique correctness score and ACT grade ($p < 0.0000001$), indicating that better inhaler technique was strongly associated with better asthma control.

Various errors in the inhalation technique were divided into three groups for the ease of analysis and the data was tabulated (**Table 3**)

Table 3: Errors in device inhalation technique

Error Categories	pMDI	DPI
Steps involved in breaking the capsule/ actuating of device/ holding the device (Pre-inhalation steps)	34/ 114 = 29.8%	59/ 240 = 24.6%
Breath related steps (Inhalation technique)	65/ 114 = 57%	138/ 240 = 57.5%
Post-inhalation steps	15/ 114 = 13.2%	43/ 240 = 17.9%

The numerator is the total errors in the respective step group. The denominator is the total number of errors for the DPI/ pMDI group. The reason for calculating this way is that many participants had multiple errors in various steps.

The most commonly observed errors among participants using dry powder inhalers (DPIs) and pMDIs were inhalational technique-related errors, accounting for more than 50% in both cases. Errors in pre-inhalation steps were marginally more common among pMDI users (29.8%) as compared to DPI users (24.6%).

Various inhalation technique errors found during the study are mentioned in **Table 4**.

Table 4: Variety of errors found

	DPI	pMDI
Steps involved in breaking the capsule/ actuating of device/ holding the device (Pre-inhalation steps)	1. Capsule opened and put in device	1. Not shaking the canister
	2. Incomplete opening of the device	2. Not removing device cap
	3. Not ensuring break/ puncture of capsule	3. Poor fitting of pMDI to spacer
	4. Not releasing the puncturing needle button	4. Holdig pMDI upside down
	5. Not making a tight lip seal	5. Actuating before inhalation
	6. Not emptying lungs before taking the inhaler	6. Multiple actuations
		7. Not emptying lungs before taking inhaler
		8. Not extending neck
Breath related steps (Inhalation technique)	1. Incomplete inhalation	1. Incomplete inhalation
	2. Too forceful inhalation	2. Too forceful inhalation
	3. Too slow inhalation	3. Too slow inhalation
	4. Not holding breath	4. Not holding breath
	5. Single inhalation	
Post-inhalation steps	1. Exhaling in to the device	1. Exhaling in to the device
	2. Not removing empty capsule	2. Not replacing the cap
	3. Not rinsing mouth	3. Not rinsing mouth
	4. Not gargling	4. Not gargling
	5. Rinsing mouth/ gargle after a time delay	5. Rinsing mouth/ gargle after a time delay
	6. Not closing the lid of the bottle of capsules thereby attracting moisture	

Not holding breath for adequate time after inhalation and failure to rinse/ gargle remained the most notable and important errors, jeopardizing drug efficacy and safety respectively. It was our passing observation that most caregivers or family members accompanying the participants had poor knowledge of the inhalation devices and inhalation technique. Most admitted that they were either not invited for the initial training session or did not pay much attention. This is an important gap observed in asthma care as the patients may continue with incorrect inhalation technique until their next scheduled visit with treating physician which may be after many weeks or months.

Assessment of inhaler device care practices also revealed considerable gaps in device maintenance behaviors as detailed in **Table 5**.

Table 5: Device care practices

Inhaler Device Care	Number	Percentage
Done Properly	33	18.13%
Cleans with Cloth	45	24.73%
Does not clean	104	57.14%

Out of the 182 participants only 33 (18.13%) reported cleaning their devices properly at regular intervals. 45 participants (24.73%) reported cleaning the device with cloth which is not recommended and is an ineffective means for ensuring proper hygiene and device functionality. Majority of participants 104 (57.14%) admitted that they did not clean their inhaler devices at all. These results indicated a substantial deficiency in patient awareness and adherence to correct inhaler device care practices. This also highlights the need for education and emphasis on inhaler device care practices as a part of asthma management.

4. Discussion

This study revealed important insights into the ground level practices of inhaler device usage, patient preferences and the common technique-related errors among asthmatic patients. A diverse range of inhalational devices were in use, with a noticeable preference for dry powder inhalers (DPIs) over pressurized metered-dose inhalers (pMDIs)**.** These findings align with other studies where DPIs are often chosen for their portability, lack of need for actuation, better control and ease of use in younger individuals with adequate inspiratory flow.[3] As we had larger number of younger participants, this can be an additional reason for finding overall preference for DPI devices. pMDI with spacers was preferred choice by the elderly, most likely due to the fact that they were unable to generate adequate inspiratory effort for DPIs.

In our study, 71.4% of participants reported that their choice of inhaler was primarily guided by their doctor's recommendation. 28.6% reported making the choice collaboratively with their doctor. Factors like brand availability, brand familiarity and device cost, influenced device preference by patients. The most important determinant was the device cost. Although the per dose cost is usually lesser in most multi-dose devices, the total cost is higher and this was an important deterrence for the patients. This can be one of the explanations why multi-dose DPIs and pMDI, which are typically always multi-dose, were used less compared to single dose DPIs.[8,9] As most participants of our

study were from average income class, a further analysis of impact of the cost on device choice was not done. It will however be interesting to evaluate this aspect in another study to see whether device choice changes in poor or wealthy class when device cost is a major or a negligible concern respectively. Other factors such as device availability, access to healthcare and education level are probably more relevant in rural areas and were not assessed in this study.

Patients who changed their device reported that the treating doctors assisted in the changes. This is a welcome finding that indicates a good patient-physician rapport, so essential for good asthma control. Elderly participants particularly had difficulty while actuating the pMDI and using a spacer and hence preferred using DPIs due to a simpler technique. Additionally, during episodes of severe dyspnoea, some participants reported relying on nebulizers instead of inhalers due to the physical effort involved in effective inhalation through DPI or pMDI. These findings are in line with earlier reports that patient adherence and satisfaction are determined by ease of use and side-effect profile of the inhaler device.[10]

Older adults frequently require assistance with inhaler use, highlighting the need for caregiver support and education. The involvement of caregivers can improve both adherence and technique, especially in elderly patients or those with cognitive limitations. It was our passing observation that many caregivers were not aware of the correct technique and had not paid attention to it during their initial device training. Involving family members may not only strengthen the doctor–patient relationship but will also foster a supportive home environment that can enhance disease control.[11]

Inhaler technique was assessed using a standardized 10-point checklist. The correctness score for DPI and MDI users was 8.40 and 7.99 respectively, a significantly low score from perfection in spite of a very recent formal training within the past month. This suggests that while formal personal training is important, a single training session is insufficient to produce sustained improvement and repeated training is needed to reinforce the correct technique that is so essential for adherence and asthma control. Training personnel, whether a physician or a pharmacist may also have some impact on the impact of training, as evaluated in other studies.[12] In another study, the authors found that even after thorough asthma education, asthma knowledge, attitude, beliefs and practices (KABP) scores dropped by 44% within just a month of training.[13] This was the reason for selecting one month post training evaluation window for the current study. Further studies are required to determine the frequency of re-training sessions to ensure good asthma control. An evaluation though a video call is also possible and is a more cost-effective option. This was evaluated by a study which found that significant errors occur right on the next day of training and therefore retaining device technique knowledge on day 1 is crucial.[14]

The most common errors were observed in the inhalation steps. This is likely to be due to difficulty in understanding these steps or failure to consistently practice them. Many patients admitted that they often forgot to exhale before inhalation or hold their breath after inhalation, especially when in a rush. An explanation by the training doctor about the relevance of each step (such as “you cannot fill tea in a cup unless it is emptied first”) may lead to better understanding and adherence.

The most common error post-inhalation was failure to rinse the mouth with water. Many patients admitted that they simply forgot this step. It is nevertheless an important step as failure to gargle may increase the chance of oral or palatal candidiasis, an important adverse effect of inhaled corticosteroids and this may force the discontinuation of the drug. A lingering bitter taste in the mouth may similarly lead to poor adherence if the gargling is not done.

Critical steps requiring focused training included initiating inhalation before actuation in pMDI use, coordinating actuation and inhalation, and holding the breath after inhalation. pMDI users often failed to actuate the device properly, leading to under or overdosing. For DPI users, the inability to generate adequate inspiratory flow remained a significant challenge. These patients also struggled with proper device handling and often forgot to hold their breath for 5–10 seconds post-inhalation. Similar findings have been reported in other studies assessing inhalation device errors among asthma patients, especially in breath-related steps and inadequate post-inhalation practices.[15,16]

Device care needs attention too. Only 18.13% of participants maintained their inhalers properly. Allowing empty capsules to stay in the device leads to external coating of these pieces on the next dose and loss of drug available for inhalation. Also while using residual powder-coated devices, the visual feedback of complete inhalation of the dose is lost. This may lead to incomplete drug inhalation and under-dosing. Keeping the lid of the capsule container open for a long time often leads to moistening of the capsules which, won’t break easily. The residual powder in DPIs may lead to microbial colonization as lactose is a common carrier substance in DPI capsules. Poor hygiene thus compromises both drug delivery and treatment efficacy.[17] Forgetfulness and lack of emphasis on device hygiene during training were the main reasons cited by the participants.

Participants with lower device technique scores were more likely to have poorer asthma control.[18] This correlation supports the established link between proper inhaler technique and asthma control, reinforcing the importance of thorough and repeated training in inhaler use. Ongoing patient education, periodic reassessment, and active involvement of healthcare providers and caregivers are

essential to ensure proper technique and improve overall disease outcomes.[19]

5. Conclusion

As various inhalational devices are available, patient participation in the device choice is a key determinant and a formal training preferably by the treating physician is important. Although all study participants had received a thorough training on device use by their physicians, a single instructional session proved insufficient for knowledge retention and the errors occurred within a month of training. Repeated training is essential for sustaining correct technique, the frequency of which needs to be assessed by future studies taking in to account variables like academic standard of the patients, age and the qualification of training personnel. Special attention should be given to elderly patients, who often face physical and cognitive barriers. Involvement of the caregiver in asthma education can improve patient adherence and ensure adequate drug delivery and asthma control. Moreover, device hygiene, an often-neglected component of asthma training needs emphasis. Optimizing inhaler use not only improves treatment efficacy but also directly contributes to better asthma control.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Agarwal R, Dhooria S, Aggarwal AN, Maturu VN, Sehgal IS, Muthu V, et al. Guidelines for diagnosis and management of bronchial asthma: Joint ICS/NCCP (I) recommendations. *Lung India*. 2015;32(Suppl 1):S3–S42.
2. Dolovich MB, Ahrens RC, Hess DR, Anderson P, Dhand R, Rau JL, et al. Device selection and outcomes of aerosol therapy: evidence-based guidelines. *Chest*. 2005;127(1):335–371.
3. Molimard M, Raherison C, Lignot S, Depont F, Abouelfath 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.
4. Sanchis J, Gich I, Pedersen S, Aerosol Drug Management Improvement Team (ADMIT). Systematic review of errors in inhaler use: has patient technique improved over time? *Chest*. 2016:150(2):394–406.
5. Melani AS, Bonavia M, Cilenti V, Cinti C, Lodi M, Martucci P, et al. Inhaler mishandling remains common in real life and is associated with reduced disease control. *Respir Med*. 2011;105(6):930–8.
6. Price D, Bosnic-Anticevich S, Briggs A, Chrystyn H, Rand C, Scheuch G, et al. Inhaler competence in asthma: common errors, barriers to use and recommended solutions. *Respir Med*. 2013;107(1):37–46.
7. Molimard M, Le Gros V. Impact of patient-related factors on asthma control. *J Asthma*. 2008;45(2):109–13.
8. Mäkelä MJ, Backer V, Hedegaard M, Larsson K. Adherence to inhaled therapies, health outcomes and costs in patients with asthma and COPD. *Respir Med*. 2013;107(10):1481–90.
9. Chrystyn H, Price D. Not all asthma inhalers are the same: factors to consider when prescribing an inhaler. *Prim Care Respir J*. 2009;18(4):243–9.
10. Usmani OS, Lavorini F, Marshall J, Dunlop WCN, Heron L, Farrington E, et al. Critical inhaler errors in asthma and COPD: A systematic review of impact on health outcomes. *Respir Res*. 2018;19(1):10.
11. Matsunaga K, Yamagata T, Minakata Y, Ichinose M. Importance of assistance by caregivers for inhaled corticosteroid therapy in elderly patients with asthma. *J Am Geriatr Soc*. 2006;54(10);1626–7.
12. Basheti IA, Reddel HK, Armour CL, Bosnic-Anticevich SZ. Improved asthma outcomes with a simple inhaler technique intervention by community pharmacists. *J Allergy Clin. Immunol*. 2007;119(6):1537–38.
13. Sahasrabudhe TR, Oswal VS, Joshi M, Khan A. Impact of single training session on correct use of inhalation devices and asthma control. *Am J Respir Crit Care Med*. 2012;185:A2880.
14. Dhadge N, Shevade M, Narke G, Pathak D, Shastri N, Barne M, et al. Evaluation of the technique of use of inhaler devices by patients at home through a video mobile application: A pilot study. *Eur Respir J*. 2019;54(suppl 63):PA5027.
15. Van der Palen J, Klein JJ, Kerkhoff AH, van Herwaarden CL, Seydel ER. Inhalation technique of 305 patients with asthma or COPD: subgroup analysis of inhalation devices. *J* Asthma. 1999;36(4):351–6.
16. Akhoon N, Brashier DB. A study to monitor errors in use of inhalation devices in patients of mild-to-moderate bronchial asthma in a tertiary care hospital in Eastern India. *J Family Med Prim Care*. 2019;8(9):2896–901.
17. Crompton GK, Barnes PJ, Broeders M, Corrigan C, Corbetta L, Dekhuijzen R, et al. The need to improve inhalation technique in Europe: a report from the Aerosol Drug Management Improvement Team. *Respir Med*. 2006;100(9):1479–94.
18. Al-Jahdali H, Ahmed A, Al-Harbi A, Khan M, Baharoon S, Bin Salih S, et al. Improper inhaler technique is associated with poor asthma control and frequent emergency department visits. *Allergy Asthma Clin Immunol*. 2013;9(1):8.
19. Boulet LP, Boulay ME, Gauthier G, Battisti L, Chabot V, Beauchesne MF, et al. Benefits of an asthma education program provided at primary care sites on asthma outcomes. *Respir Med*. 2015;109(8):991–1000.

Cite this article: Sahasrabudhe TR, Anand A. Perspective of asthma patients on inhalation devices: Scenario from Urban India. *IP Indian J Immunol Respir Med*. 2025;10(3):126-132.