

Exploring the Insights and Interventions for Barriers to Adherence in Bronchial Asthma Treatment through a Patient-centered Approach

Pritama Paul¹, Abhishek Bhattacharjee², Surendra R Kovvuru³, Mukesh Kumar⁴, Gurkaran Bedi⁵, Uttam K Paul⁶

Received on: 10 April 2024; Accepted on: 02 May 2024; Published on: 06 July 2024

ABSTRACT

Background: Bronchial asthma, characterized by airway inflammation and hyperresponsiveness, affects millions worldwide, with a significant prevalence in India. Despite effective treatments with inhalation drugs, nonadherence to hand-held devices poses a substantial challenge, leading to uncontrolled symptoms and increased healthcare burden.

Aims and objectives: This study aims to investigate the reasons for nonadherence to hand-held inhalation devices in bronchial asthma treatment, identify barriers, and propose strategies for improvement through various intervention approaches.

Materials and methods: This qualitative study was conducted at a tertiary medical college in Bihar, India, included 229 patients with uncontrolled bronchial asthma. Data collection involved in-depth interviews (IDIs) and subsequent interventions targeting identified barriers, such as patient education, supply assurance, and behavioral interventions. Data analysis involved transcription, coding, and categorization of interview responses using qualitative research standards.

Results: Analysis revealed multifaceted challenges contributing to nonadherence, including treatment costs, inhaler availability, lack of treatment response, and motivational issues. Following interventions, 15% of patients became symptom free, while 40% showed improvement. The study highlighted the importance of interventions in addressing adherence barriers and improving patient outcomes.

Conclusion: Despite the challenges, proper interventions targeting identified barriers showed promising results in enhancing bronchial asthma treatment adherence and improving patient conditions. Further research with larger samples and longer follow-up periods is warranted to refine treatment strategies and deepen the understanding of adherence behavior in bronchial asthma patients.

Keywords: Bronchial asthma, In-depth-interview, Inhalation devices, Nonadherence.

Bengal Physician Journal (2024): 10.5005/jp-journals-10070-8043

INTRODUCTION

Bronchial asthma is a chronic inflammatory airway disease characterized by variable and recurring symptoms, reversible airflow obstruction, and bronchospasm. It results from a complex interaction of genetic predisposition and environmental factors, leading to airway hyperresponsiveness and inflammation. The pathophysiology of bronchial asthma involves the interplay of inflammatory cells and inflammatory mediators within the airway. The process begins with exposure to an asthma trigger, leading to an immune response that causes airway inflammation, bronchoconstriction, and increased mucus production. This results in the characteristic symptoms of asthma: coughing, wheezing, shortness of breath, and chest tightness.¹⁻³

Asthma affects millions of people worldwide. In India alone, approximately 37 million individuals suffer from this condition, significantly impacting their quality of life and imposing a substantial burden on healthcare systems.⁴

Treatment for bronchial asthma is crucial to control symptoms, improve pulmonary function, and prevent exacerbations. Effective asthma management hinges on consistent adherence to prescribed therapies, including different inhalational drugs delivered via hand-held devices. Inhalers are the cornerstone of asthma treatment, offering rapid relief of symptoms and long-term control by delivering bronchodilators, corticosteroids, or combination medications directly to the airways.⁵⁻⁷

^{1,2}Department of Pharmacology, Mata Gujri Memorial Medical College & Lions Seva Kendra Hospital, Kishanganj, Bihar, India

³⁻⁶Department of Medicine, Mata Gujri Memorial Medical College & Lions Seva Kendra Hospital, Kishanganj, Bihar, India

Corresponding Author: Uttam K Paul, Department of Medicine, Mata Gujri Memorial Medical College & Lions Seva Kendra Hospital, Kishanganj, Bihar, India, Phone: +91 7001792779, e-mail: druttam131065@gmail.com

How to cite this article: Paul P, Bhattacharjee A, Kovvuru SR, *et al.* Exploring the Insights and Interventions for Barriers to Adherence in Bronchial Asthma Treatment through a Patient-centered Approach. *Bengal Physician Journal* 2024;11(2):55-60.

Source of support: Nil

Conflict of interest: None

However, nonadherence to treatment regimens is a significant barrier, with studies reporting rates as high as 50%. Factors contributing to nonadherence include misconceptions about the disease and its treatment, fear of side effects, complexity of the treatment regimen, and lack of perceived necessity for regular medication. Studies suggest that a substantial proportion of patients fail to use their inhalers correctly or consistently, leading to uncontrolled asthma and increased healthcare costs.⁸⁻¹⁰

The challenges in addressing nonadherence are multifaceted, encompassing patient education, communication, device technique, and follow-up care. Overcoming these challenges requires a comprehensive patient-centered approach.¹¹

Hence, this study aims to explore the reasons for nonadherence to hand-held devices in bronchial asthma treatment, identify potential barriers, and suggest strategies to improve adherence, ultimately enhancing asthma control and patient outcomes. Through a deeper understanding of the complexities surrounding treatment adherence in asthma, we aim to contribute to the development of specific interventions that promote optimal disease control and improve patients' quality of life. The study will explore patients' experiences, challenges, and potential interventions to address nonadherence.

MATERIALS AND METHODS

Study Design

This study applied a qualitative research design that included in-depth interviews (IDIs) to explore the causes of non-adherence to hand-handled devices in the treatment of bronchial asthma and analyzed the post-intervention outcomes.

Study Settings

The study was carried out in the Department of Medicine, Mata Gujri Memorial Medical College, Kishanganj, Bihar, India.

Study Participants

The study participants were patients (>18 years) diagnosed with Bronchial asthma using hand-handled devices and attended in the Department of Medicine, Mata Gujri Memorial Medical College, Kishanganj, Bihar, India.

Number of Participants

A total of 229 individuals that included 131 females and 98 males, with uncontrolled bronchial asthma were included.

Inclusion Criteria

The study included individuals with bronchial asthma who had been administered inhalational drugs but experiencing symptoms and gave their consent for IDIs.

Exclusion Criteria

Asthma patients with comorbid conditions were not included in the study. Five participants refused to participate in the study.

Study Period

The research was done between March 2023 and February 2024.

Data Collection

Institutional Ethics Committee (IEC) provided formal approval at the beginning of the study. 229 participants, who consented to the study were interviewed in-depth over 10–15 minutes each to collect the qualitative data. The interview was conducted in their language after explaining the study objective thoroughly. While conducting the interview meticulous field notes were taken.

Healthcare professionals employed various intervention techniques to address nonadherence to hand-held devices in bronchial asthma treatment. Patient education and training were paramount, involving comprehensive instruction on device usage through hands-on sessions supplemented by visual aids such as

videos or diagrams. Following the interview, the intervention was carried out which comprised of the following steps:

Steps	Time (minutes)
Counseling	5
Demonstration of MDI/Rotahaler correctly	3
Demonstration by the subject/participants	5
Oral hygiene after inhaler use	2
Question and answer	5
Total	20

MDI, metered dose inhaler

Regular follow-up appointments for assessment and monitoring, alongside tools such as asthma diaries and mobile applications, allow for ongoing evaluation and adjustment of treatment plans. Medication regimens were simplified, reminder systems were utilized, and alternative delivery devices or formulations were explored as additional strategies to enhance adherence. Behavioral interventions, including cognitive-behavioral therapy, were instrumental in addressing psychological barriers to adherence. The choice of intervention to promote adherence depended on feasibility and availability within a practice or health system.^{12–15}

Data Analysis

The interview questions were open ended. The text describes a research process where interviews were transcribed into English and manually studied. Descriptive "codes" were created from the textual data, and related codes were combined into "categories." The research adhered to the requirements for reporting qualitative research using consolidated criteria. The authors wrote, edited, and revised the script. Microsoft Excel was used to analyze the data.

RESULTS

We have included a total of 229 bronchial asthma patients in our qualitative study. The age group of patients with bronchial asthma varied from 18 to 67 years. Age-wise distribution of patients in the study is depicted in [Table 1](#). The educational status of the patients in the study is depicted in [Figure 1](#).

The distribution of bronchial asthma patients in the study reveals notable patterns when categorized by their age and gender. Among the age groups surveyed, the highest concentration of patients is observed in the 18–30-year age group, constituting 35% of the total population. In contrast, the lowest percentage is found among individuals aged 61 years and above. Across all age groups, females consistently exhibit slightly higher representation compared to males. Specifically, within each age category, females comprise a larger proportion of asthma patients than males. This data underscores the importance of age and gender considerations in understanding the prevalence of bronchial asthma within the population.

The educational status of bronchial asthma patients, as indicated by the data from the study, demonstrates varied levels of educational attainment among the participants. The largest proportion of patients possess primary education, accounting for 34% of the total number of patients. Following closely behind are those who are not able to read and write, comprising 20% of the patient population. Secondary education represents 18% of patients, while higher secondary education accounts for 15%. A smaller yet

Table 1: Age-wise distribution of bronchial asthma patients in the study

Age (years)	Male (98)	Percentage	Female (131)	Percentage	Total (229)	Percentage
18–30	39	17	41	18	80	35
31–40	24	10	37	16	61	26
41–50	16	7	34	15	50	22
51–60	17	7	15	7	32	14
61 and above	2	1	4	2	6	3

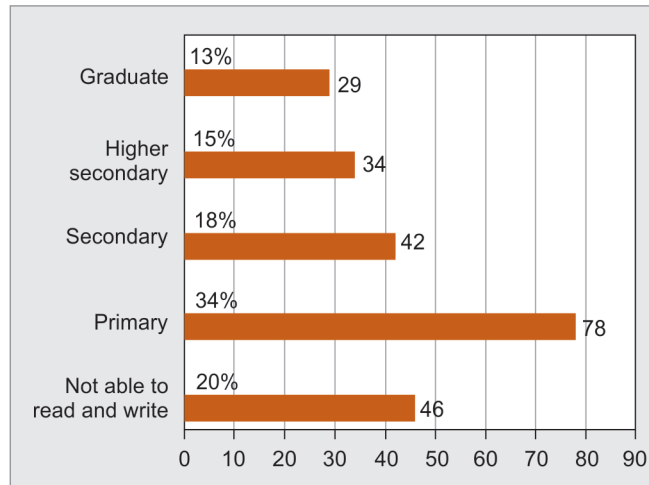


Fig. 1: Educational status of bronchial asthma patients in the study

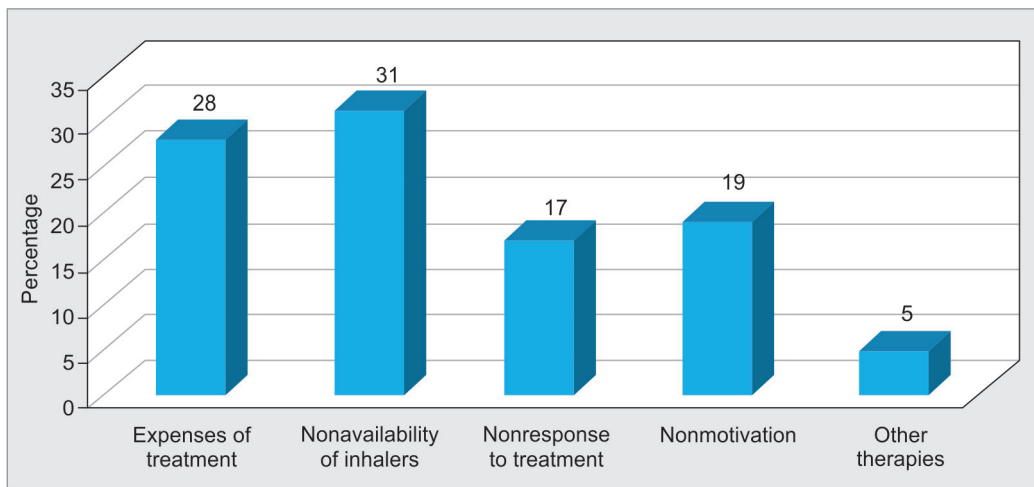


Fig. 2: Qualitative data analysis of IDIs of bronchial asthma patients regarding nonadherence to hand-held devices

notable portion of patients are graduates, constituting 13% of the studied population. These findings underscore the importance of considering educational background when addressing bronchial asthma and developing appropriate interventions for affected individuals.

Figure 2 illustrates the qualitative data analysis derived from IDIs conducted with 229 bronchial asthma patients, focusing on their nonadherence to hand-held devices. The data reveals the various factors contributing to nonadherence among patients. A significant portion, constituting 28% of the surveyed patients, identified the expenses associated with treatment as a primary

reason for their nonadherence. Similarly, 31% of patients cited the nonavailability of inhalers as a major hurdle in adhering to their prescribed regimen. A notable proportion, comprising 17% of respondents, reported nonresponse to treatment as a key factor influencing their nonadherence behavior. Additionally, 19% of patients admitted to lacking the necessary motivation to adhere to their treatment plan. Moreover, 5% of respondents indicated their exploration of alternative therapies as a reason for nonadherence. These findings underscore the multifaceted challenges faced by bronchial asthma patients in maintaining adherence to their prescribed inhaler usage. The insights gleaned from this analysis

Table 2: Intervention techniques used for nonadherence to hand-handled devices in bronchial asthma treatment in this study

Category	Intervention techniques applied
Expenses of treatment	<ul style="list-style-type: none"> • Patients were educated about their options for obtaining affordable asthma medications and devices. • The use of generic medications or alternative brands that were more affordable was encouraged. • Telehealth appointments were utilized to reduce in-person visit costs associated with device monitoring and medication adjustments.
Nonavailability of inhalers	<ul style="list-style-type: none"> • Worked with healthcare providers and pharmacies to ensure a consistent supply of inhalers. • Provided home delivery services for asthma medications and devices to overcome issues related to availability.
Nonresponse to treatment	<ul style="list-style-type: none"> • Patients were educated about the proper technique to use hand-held devices (meter dose inhalers, Rotahalers, etc.). • Regular follow-up appointments were held to assess treatment response and adjust medications accordingly. • Patients were educated about the importance of adherence and the potential consequences of nonresponse to treatment. • Explored alternative treatment options or adjunct therapies for patients who did not respond to conventional treatments. • Patients were encouraged to monitor and record symptoms to identify potential triggers and assess treatment effectiveness.
Nonmotivation	<ul style="list-style-type: none"> • Patient education and counseling enhanced understanding of the disease and the importance of treatment adherence. • Offered motivational interviewing or counseling sessions to address barriers to motivation and adherence. • The use of technology, such as reminder systems (mobile applications), was also suggested and provided.
Other therapies	<ul style="list-style-type: none"> • Explored complementary therapies such as breathing exercises or meditation alongside traditional treatments to enhance overall management. • Discussed the potential benefits of combining hand-held devices with other therapies like allergy control or nebulizers for a more comprehensive approach.

Table 3: Distribution of bronchial asthma patients after the interventions

Patients' outcome	Number of patients	Percentage
Did not turn up	47	21
No improvements	54	24
Improved	94	40
Symptoms free	34	15

shed light on areas where additional support and resources could be instrumental in addressing these challenges and promoting better adherence among patients.

Intervention

Various intervention techniques (Table 2) were used to address various barriers to adherence and treatment effectiveness identified in the study, ultimately improving outcomes for patients with bronchial asthma.

Outcome after Intervention

A total of 34 (15%) patients became symptom free; 94 (40%) patients had improved; no improvement was observed in 54 (24%) patients and 47 (21%) patients did not turn up for further follow-up (Table 3; Fig. 3).

DISCUSSION

The study provides insights into the adherence behavior of bronchial asthma patients, involving 229 individuals aged 18–67

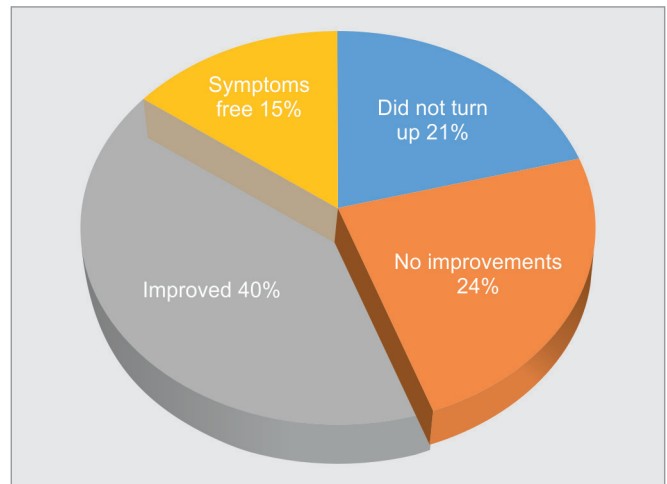


Fig. 3: The outcome of intervention on bronchial asthma patients

years. It notes a predominant representation of younger patients, particularly females, highlighting the significance of age and gender in understanding asthma prevalence. Educational background varied among patients, with a notable portion having primary education or lacking literacy altogether. Nonadherence to inhaler use was linked to factors such as cost, availability, and motivation. Interventions included education on affordable medications, consistent inhaler supply, proper device usage, motivational sessions, and complementary therapies. Postintervention, 15%

of patients were symptom free, 40% improved, 24% showed improvement, and 21% were lost to follow-up, indicating the effectiveness of the applied intervention techniques in improving the condition of bronchial asthma patients.

A study about nonadherence to bronchial asthma treatment interviewed 300 asthma patients and revealed the causes of nonadherence in bronchial asthma as nondrug-related and drug-related issues. Nondrug issues were the main issues for reduced adherence. The main nondrug issues associated with poor adherence were fears about side effects of the medications, higher cost of the medicines, feeling of well-being on treatment and negligence on the part of the patients, forgetfulness or complacency, attitudes toward ill health, and irritation about the disease. The reasons for drug-related factors for nonadherence included the cost of treatment, problems with inhaler devices, difficult regimens, dislike of medications, and distant pharmacy shops.¹¹

A study performed a systematic review of observational research on determinants of asthma inhaler adherence among adults. It found consistent links between adherence and stronger inhaler-necessity beliefs, and possibly older age. The study also highlighted the need for broader adoption of common methodological standards and health behavior theories to develop further cumulative science on the determinants of adherence to asthma inhalers among adults.¹⁶ A study in Sweden included 77 randomly selected bronchial asthma patients. Out of these 63 participated in the study and were interviewed using a semi-structured questionnaire. The issues recognized for self-reported adherence with prescribed medication were the age of the patients, gender, duration of the disease, the attitude of the health employees, and information as well as education about bronchial asthma.¹⁷

Another study stated that many interacting factors influenced nonadherence. Intentional nonadherence is common; driven by illness perceptions and medication beliefs, patients and parents deliberately choose not to follow the doctor's prescriptions. Common nonintentional causes of nonadherence are related to family routines, child-raising issues, and social issues such as poverty.¹⁸

A review that presents evidence-based strategies for healthcare providers to improve adherence to inhaled therapies in asthma and chronic obstructive pulmonary disease (COPD) patients, including shared decision-making, patient education, and addressing common barriers to adherence.¹⁹ According to a study, frequent instruction in proper inhaling techniques led to significant improvements in 146 out of 176 patients with bronchial asthma.²⁰ In a study, an analysis of interventions used to promote adherence to asthma medications in adults found that technology-delivered interventions significantly enhanced adherence.²¹ Another study highlighted the importance of regular monitoring and a patient-centered self-management approach to address nonadherence in long-term pharmacotherapy for chronic diseases like asthma.²² Another study shows the results of 153 studies published between 1977 and 1994 that evaluated the effectiveness of interventions to improve patient compliance with medical regimens.²³

Another systematic literature review identifies enabling and hindering factors influencing adherence to asthma treatment among adolescents, emphasizing the role of caregivers and healthcare providers in supporting adolescents with asthma.²⁴

However, our study findings suggest the effectiveness of the interventions in enhancing the improvement in bronchial asthma patients and emphasize the importance of tailored interventions to address adherence barriers and improve treatment outcomes.

Limitations of the Study

The study on bronchial asthma patient adherence behavior had limitations including a small sample size of 229 patients, potentially limiting the representation of the entire population. It considered age and gender but overlooked other demographic factors like socioeconomic status or location, affecting the generalizability of findings. Relying on self-reported data could introduce bias. The short-term follow-up period after intervention may have affected the assessment of long-term effectiveness. Moreover, the study applied various intervention techniques without a standardized protocol, complicating the evaluation of their specific impacts.

Further research with larger, more diverse samples and longer follow-up periods could strengthen these findings and provide a more comprehensive understanding of adherence behavior in bronchial asthma patients. Additionally, future studies could explore the specific impact of each intervention technique to optimize future treatment plans.

CONCLUSION

This study provides valuable insights into the adherence behavior of bronchial asthma patients, shedding light on various factors contributing to nonadherence and the effectiveness of intervention techniques in addressing these barriers. It highlights the importance of considering these factors when designing interventions for better patient outcomes. The interventions applied, such as patient education, ensuring inhaler supply, teaching proper inhaler usage, motivational interviewing, and exploring complementary therapies, have shown promising results in improving patient conditions. To enhance our clench of adherence behavior in bronchial asthma patients, future research should involve varied samples, extended follow-up, and intervention techniques to refine treatment strategies.

REFERENCES

1. Papi A, Brightling C, Pedersen SE, et al. Asthma. *Lancet* 2018; 391(10122):783–800. DOI: 10.1016/S0140-6736(17)33311-1.
2. Busse WW, Lemanske RF Jr. Asthma. *N Engl J Med* 2001;344(5): 350–362. DOI: 10.1056/NEJM200102013440507.
3. Broide D. New perspectives on mechanisms underlying chronic allergic inflammation and asthma in 2007. *J Allergy Clin Immunol* 2008;122(3):475–480. DOI: 10.1016/j.jaci.2008.06.025.
4. Singh S, Salvi S, Mangal DK, et al. Prevalence, time trends and treatment practices of asthma in India: The Global Asthma Network study. *ERJ Open Res* 2022;8(2):00528–02021. DOI: 10.1183/23120541.00528-2021.
5. Papi A, Blasi F, Canonica GW, et al. Treatment strategies for asthma: Reshaping the concept of asthma management. *Allergy Asthma Clin Immunol* 2020;16:75.
6. Barnes PJ. How corticosteroids control inflammation. *Br J Pharmacol* 2006;148(3):245–254. DOI: 10.1038/sj.bjp.0706736.
7. Rhen T, Cidlowski JA. Antiinflammatory action of glucocorticoids: New mechanisms for old drugs. *New Engl J Med* 2005;353(16):1711–1723. DOI: 10.1056/NEJMra050541.
8. Kvarnström K, Westerholm A, Airaksinen M, et al. Factors contributing to medication adherence in patients with a chronic condition: A

- scoping review of qualitative research. *Pharmaceutics* 2021;13(7):1100. DOI: 10.3390/pharmaceutics13071100.
9. Kaplan A, Price D. Treatment adherence in adolescents with asthma. *J Asthma Allergy* 2020;13:39–49. DOI: 10.2147/JAA.S233268.
 10. Amin S, Soliman M, Mclvor A, et al. Understanding patient perspectives on medication adherence in asthma: A targeted review of qualitative studies. *Patient Prefer Adherence* 2020;14:541–551. DOI: 10.2147/PPA.S234651.
 11. Sarker MAS, Salma U, Zafrin N, et al. Factors affecting the non-adherence to inhalational medication in bronchial asthma: A cross sectional study in a tertiary care Hospital. *J Med* 2019;21(1):41–45. Available from: <http://dx.doi.org/10.3329/jom.v21i1.44108>.
 12. Axelsson M, Björk B, Berg U, et al. Effect of an educational program on healthcare professionals' readiness to support patients with asthma, allergies, and chronic obstructive lung disease for improved medication adherence. *Nurs Res Pract* 2020;2020:1585067. DOI: 10.1155/2020/1585067.
 13. Schooley B, Singh A, Hikmet N, et al. Integrated digital patient education at the bedside for patients with chronic conditions: Observational study. *JMIR Mhealth Uhealth* 2020;8(12):e22947. DOI: 10.2196/22947.
 14. Puah SH, Goh CY, Chan CL, et al. Mobile device: A useful tool to teach inhaler devices to healthcare professionals. *BMC Medical Education* 2022;22(1):238. DOI: 10.1186/s12909-022-03302-0.
 15. Grover N, Kumaraiah V, Prasadrao PSDV, et al. Cognitive behavioural intervention in bronchial asthma. *J Assoc Physicians India* 2002;50:896–900. PMID: 12126343.
 16. Dima AL, Hernandez G, Cunillera O, et al. Asthma inhaler adherence determinants in adults: Systematic review of observational data. *Eur Respir J* 2015;45(4):994–1018. DOI: 10.1183/09031936.00172114.
 17. Lindberg M, Eström J, Möller M, et al. Asthma care and factors affecting medication compliance: The patient point of view. *Intern J Quality Health Care* 2001;13:375–383. DOI: 10.1093/intqhc/13.5.375.
 18. Klok T, Kaptein AF, Brand PLP. Non-adherence in children with asthma reviewed: The need for improvement of asthma care and medical education. *Pediatr Allergy Immunol* 2015;(3):197–205. DOI: 10.1111/pai.12362.
 19. George M, Bender B. New insights to improve treatment adherence in asthma and COPD. *Patient Prefer Adherence* 2019;13:1325–1334. DOI: 10.2147/PPA.S209532.
 20. Takemura M, Kobayashi M, Kimura K, et al. Repeated instruction on inhalation technique improves adherence to the therapeutic regimen in asthma. *J Asthma* 2010;47(2):202–208. DOI: 10.3109/02770900903581692.
 21. Alwadhahi A, Garvey L, Stephenson J, et al. Asthma inhaler adherence in adults: A rapid systematic review with meta-analysis. *SN Compr Clin Med* 2022;4(1):84. DOI: 10.1007/s42399-022-01161-w.
 22. Jimmy B, Jose J. Patient medication adherence: Measures in daily practice. *Oman Med J* 2011;26(3):155–159. DOI: 10.5001/omj.2011.38.
 23. Roter DL, Hall JA, Merisca R, et al. Effectiveness of interventions to improve patient compliance: A meta-analysis. *Med Care* 1998;36(8):1138–1161. DOI: 10.1097/00005650-199808000-00004.
 24. Ahmad A, Sorensen K. Enabling and hindering factors influencing adherence to asthma treatment among adolescents: A systematic literature review. *J Asthma* 2016;53(8):862–878. DOI: 10.3109/02770903.2016.1155217.