Journal of Society Medicine
Research & Review Articles on Diseases
Journal of Society Medicine. 2024; 3(10)

The Effect of Providing Education on the Use of Inhalers on Asthma Degrees Based on the Asthma Control Test (ACT) in Patients at Tanjungpura Hospital

Sri Bayani[1*], Amira Permatasari Tarigan[2], Pandiaman Pandia[2], Rina Amelia[3], Budi Jefri[4]

[1] *Department of Pulmonology and Respiratory Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan Indonesia.*
[2]*Division of Asthma and COPD, Department of Pulmonology and Respiratory Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia.*
[3]*Department of Community Medicine/Public Health, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia.*
[4]*Faculty of Medicine, Universitas Methodist Indonesia, Medan Indonesia.*

***Corresponding Author**: Sri Bayani, E-mail: sribayani93@gmail.com

ARTICLE INFO

Article history:
Received
19 September 2024

Revised
1 October 2024

Accepted
30 October 2024

Manuscript ID:
JSOCMED-190924-310-1

Checked for Plagiarism: Yes

Language Editor:
Rebecca

Editor-Chief:
Prof. Aznan Lelo, PhD

ABSTRACT

Introduction: The main goal of asthma treatment is to control symptoms and reduce emergency department (ED) visits due to acute exacerbations. Drug delivery through inhalation is an important component of asthma management. Patients with asthma should have a good knowledge of their disease to recognize signs of worsening that can be prevented by early detection. Asthma control can be evaluated using the Asthma Control Test (ACT). To determine the effect of providing education on the use of inhalers on the degree of asthma based on the ACT in patients at Tanjungpura Regional General Hospital.

Methods: This quasi-experimental study conducted from March 2024 to May 2024, used a one-group pre-test and post-test design to evaluate the effect of education via smartphone applications on asthma control (ACT). Obtained 54 patients who were diagnosed asthma at Tanjungpura Regional General Hospital. The sample consisted of asthma patients using inhalers, selected consecutively based on inclusion and exclusion criteria.

Results: Most patients were female (64.8%) with ages 18-60 years (83.3%). The majority were housewives (46.2%). Post-test showed that 75.9% of patients had partial asthma control. All patients (100%) used inhalers correctly after education. There was a significant difference in ACT results before and after education (P-value 0.001) and an increase in ACT scores after the first and second education (P-value 0.002 and 0.001, respectively).

Conclusion: Providing education on the use of inhalers has a positive effect on ACT scores in asthma patients, with an increase in the mean ACT score from 15.67 before education to 17.11 after the first education, and 20.96 after the second education.

Keywords

Asthma, Asthma control test, Asthma degrees, Education, Inhalers

How to cite: Bayani S, Tarigan AP, Pandia P, Amelia R, Jefri B. the Effect of Providing Education on the use of Inhalers on Asthma Degrees Based on the Asthma Control Test (Act) In Patients at Tanjungpura Hospital. Journal of Society Medicine. 2024; 3 (10): 288 - 293. **DOI: https://10.47353/jsocmed.v3i10.168**

INTRODUCTION

A Asthma is a heterogeneous disease usually characterized by chronic airway inflammation. The disease is diagnosed based on a history of respiratory symptoms, such as wheezing, shortness of breath, chest tightness, and coughing that vary in intensity over time along with variable expiratory airflow limitation.[1,5]

Asthma sufferers as people who have the potential to experience asthma attacks must have a good knowledge of their disease, so that they can recognize signs that indicate the worsening of the disease which can actually be prevented if known early.[6] Therefore, understanding the level of asthma control and the ability of asthma sufferers to detect their level of asthma control at any time is a major problem in achieving

a level of asthma that is fully controlled. If patients know clearly what triggers their disease, then they can avoid these triggers and the possibility of asthma attacks can be avoided. If they cannot avoid the triggers then they know what preventive measures to take.[7]

The asthma control test (ACT) is a tool that can be used to evaluate asthma control in patients and its use is recommended. This tool is very simple and easy because it contains 5 questions that must be filled in by the patient, then given a score on each question answer with a score value of 1 to 5. The maximum score is 25 with the following division: score 19 or less (uncontrolled asthma); score 20 - 24 (partially controlled asthma) and score 25 (totally controlled asthma).[8] he primary goals of asthma treatment are to control symptoms and to reduce emergency department (ED) visits for treatment of acute asthma exacerbations.[9] One study reported only 5% asthma control among patients hospitalized with tertiary care.[10] Poor asthma control remains a frequent cause of ED visits and hospitalizations.[11] In addition, it should be kept in mind that the cost of uncontrolled asthma care is considerable. For example, ER visits for asthma management account for nearly one-third of all asthma costs in the United States.[12]

Today, inhaled drug delivery is an integral component in the treatment and management of patients with airway obstruction disease. Unlike systemic treatment, inhaled medications are rapidly directed into the airways allowing for rapid onset.[13] Inhaled administration of corticosteroids is considered the optimal route for proper drug delivery for the treatment of bronchial asthma and can reduce asthma hospitalizations by as much as 80%.[14] Drug classes used in the management of this disease include β-receptor agonists, anticholinergic agents, and corticosteroids. These drugs are often administered in the form of a pressurized metered-dose inhaler (pMDI), dry powder inhaler (DPI), or with a nebulizer. pMDI and DPI are the preferred inhalation methods as patients can use them on their own with minimal assistance if taught well.[16] The most important advantage of inhalation therapy is the direct and localized delivery of high concentrations of drugs to the airway with minimal systematic side effects.[17]

This study aims to evaluate the effect of providing inhaler use education on asthma grade based on asthma control test (ACT) among asthma patients in developing countries such as Indonesia and to identify the determinants of poor inhaler technique by offering solutions on how to improve inhaler use among the growing number of asthma patients.

METHODS

The research was performed in an experimental study using the method of one-group pre-test and post-test design from from March 2024 to May 2024 in Tanjungpura General Hospital. The research had ethical clearance agreement number 149/KEPK/USU/2024 and applied strict health protocols.

The research was conducted in several stages, including demographic data collection, asthma control test (ACT) before and after inhaler use education, and evaluation of inhaler use. Education was provided in two sessions, and ACT test results were compared to assess the effect of education.

RESULTS

A total of 54 asthma patients participated in this study. The majority of patients were female (35 people, 64.8%) and were in the age range of 40-60 years (32 people, 59.3%). Most patients worked as housewives (25 people, 46.2%).

Before education, 48 patients (88.9%) had uncontrolled asthma control, and only 6 patients (11.1%) had partial asthma control. After the first education, the number of patients with uncontrolled asthma control decreased to 46 (85.1%), while patients with partial asthma control increased to 8 (14.9%). After the second education, the number of patients with uncontrolled asthma control reduced further to 10 (18.5%), patients with partial asthma control increased to 41 (75.9%), and 3 patients (5.6%) achieved full asthma control.

Before education, 32 patients (59.3%) used the inhaler correctly, and 22 patients (40.7%) used the inhaler in the wrong way. After education, there was an increase in the correct use of inhalers among patients.

Table 1. Demographic Characteristics of Asthma Patients

Characteristics	n	%
Gender		
Male	19	35,2
Female	35	64,8
Age		
<40 Years	12	22,2
40-60 Years	32	59,3
>60 Years	10	18,5
Jobs		
IRT	25	46,2
Merchant	17	31,4
Farmers	4	7,4
Retired civil servants	3	5,6
Teacher	2	3,7
Student	1	1,9
Mine Workers	1	1,9
Civil workers	1	1,9
n	54	100%

Table 2. ACT Test Result

ACT	Mean	n	%
Uncontrolled	15.02	48	88,9
Partially Controlled	20,8	6	11,1
Post Ed 1			
Uncontrolled	15,75	46	85,1
Partially Controlled	19,84	8	14,9
Post Ed 2			
Uncontrolled	16,8	10	18,5
Partially Controlled	21,3	41	75,9
Fully Controlled	25	3	5,6
n	54		100%

Before education, 32 patients (59.3%) used the inhaler correctly, and 22 patients (40.7%) used the inhaler in the wrong way. After education, there was an increase in the correct use of inhalers among patients.

Table 3. Inhaler Usage

Inhaler Usage	n	%
Correct		
Not true	19	35,2
Post Ed 1	35	64,8
Correct		
Not true	12	22,2
Post Ed 2	32	59,3
Correct	10	18,5
Not true		
n	54	100%

DISCUSSION

Based on the results of the study, it is known that women are the most asthma patients, namely 35 people (64.8%). Studies have shown that asthma is more common in boys than in young girls; however, gender differences reverse after puberty, with females experiencing higher rates of asthma exacerbations and hospital admissions in adulthood.[18,19] Furthermore, women with asthma are more likely to report poor asthma control, increased exacerbations, and obesity despite having higher percent FEV1 estimates, lower FeNO, and Total IgE compared to their male counterparts.[20]

This suggests that women with asthma face unique challenges in managing their condition, which may be exacerbated by factors such as depression and salicylate sensitivity, which have been found to have a higher prevalence among women with early onset difficult asthma.[21] The most common occupation was housewife as many as 25 people (46.2%), then traders as many as 17 people (31.4%), and farmers as many as 4 people (7.4%). The prevalence of asthma among housewives is strongly influenced by exposure to allergens and irritants found in the home environment. For example, peeling raw potatoes has been identified as a trigger for asthma attacks and rhinoconjunctivitis in housewives, highlighting the role of specific food allergens in exacerbating asthma symptoms.[22,23]

In addition, the use of cleaning products, especially those containing bleach and ammonia, have been strongly associated with an increased risk of asthma and chronic bronchitis symptoms among women involved in household cleaning.[24-26] In conclusion, most female asthmatics are those who are post-pubertal, obese, and may have a genetic predisposition, with hormonal changes playing an important role in the exacerbation of the condition.[27-29] The highest age was 18-60 years, namely 45 people (83.3%). This study is in line with Sofie's research (2015), that the highest incidence of asthma is at the age of 18-60 years, and reinforced by Brunello (2013) who said the prevalence of asthma was higher at the age of <60 years.[30,31]

Based on the results of the study, it was also found that the asthma control test scores of patients after being given education on the use of inhalers increased. Studies have shown that proper inhaler technique, essential for effective asthma control, is often lacking among patients, with most using their inhalers incorrectly, leading to poor disease control.[32,33] Educational interventions, especially those led by pharmacists, have been shown to markedly improve inhaler technique.[34-36] For example, asthma education interventions. Have resulted in significant improvements in asthma control test scores, indicating better asthma control.[37,38] In addition, educational programs targeting patients and patient caregivers have been associated with improved asthma control, including a reduction in daytime and nighttime symptoms, as well as decreased emergency department visits and hospitalizations.[39] These programs also lead to better inhalation techniques and lung function, further contributing to improved quality of life for asthma patients.[40]

Examination of various studies reveals a consistent pattern indicating that educational interventions significantly improve knowledge and techniques related to inhaler use, which can be inferred to impact asthma control test (ACT) scores indirectly through improved asthma management. Jayachandran and Dr. Suvarnaletha Devi's (2020) study showed a significant increase in knowledge about inhaler use among asthma patients following a structured education program, suggesting that better understanding may lead to improved asthma control.[41] Similarly, Nevhiz Gundogdu and Necla Benlier (2020) found that higher education levels were associated with greater dexterity and perceived therapeutic benefit in the use of inhaler devices, although they did not directly link this to asthma control test scores.[42]

Jaishree Ganjiwale et al. (2019) study on nurses showed that individualized training significantly improved proficiency of inhaler use, which is critical for patient education and potentially improving patient asthma management outcomes.[43] G K Nalini et al. (2019) highlighted that educational interventions, especially interactive demonstrations, are effective in teaching correct inhaler technique to healthcare professionals, which can indirectly influence patient education and asthma control.[44] S A Mahfouz et al (2016). and R.P. Thomas et al. (2017) both emphasized the importance of correct inhaler use and continuing education in improving COPD and asthma management, showing a potential positive impact on asthma control test scores through better disease control.[45,46]

Sevda Efil et al (2015) and Olufemi Olumuyiwa Desalu et al (2020), both reported improvements in medication management and knowledge of asthma and inhaler techniques following educational interventions, which may lead to better asthma control as measured by asthma control test scores.[47,48] Jasmin Shijo's (2020) study of an educational intervention among mothers of children with respiratory infections showed a significant improvement in knowledge and practice regarding the use of metered dose inhalers, which is important for effective asthma management in children, potentially affecting their asthma

control test scores.[49] Lastly, Tiago Maricoto et al. (2013) directly linked an educational intervention to improve inhaler technique with significant improvements in clinical and functional control of asthma, which would likely be reflected in improved asthma control test scores.[50]

The results of research by Sunarti (2015) showed that based on the Mann Whitney test there were changes in the level of asthma control in the control and counseling groups with a p value of p=0.000 (α<0.05). This study concluded that education can affect the level of asthma control in the education group compared to the control group.[51]

CONCLUSION

Inhaler use education in patients with asthma was found to be effective in improving asthma control and adherence to inhaler use. Continuous and ongoing education is needed to achieve optimal asthma control in patients.

DECLARATIONS

We would like to thanks to the Tanjungpura Regional General Hospital Faculty of Medicine, Universitas Sumatera Utara and everyone who take part for this research.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

FUNDING

This research has received no external funding

COMPETING INTERESTS

The authors declare that there is no conflict of interest in this report.

ACKNOWLEDGMENTS

None

REFERENCE

1. Global Initiative for Asthma. GINA Report: Global Strategy for Asthma Management and Prevention Global Initiative for Asthma. 2023; 1:1-22.
2. Yii AC, Soh AZ, Chee CBE, Wang YT, Yuan JM, Koh WP. Asthma, Sinonasal Disease, and the Risk of Active Tuberculosis. J Allergy Clin Immunol Pract. 2019; 7 (2): 641-648.
3. D'Amato M, Molino A, Calabrese G, Cecchi L, Annesi-Maesano I, D'Amato G. The impact of cold on the respiratory trasthma control test and its consequences to respiratory health. Clin Transl Allergy. 2018; 8: 20.
4. Burrows B, Barbee RA, Cline MG, Knudson RJ, Lebowitz MD. Characteristics of asthma among elderly adults in a sample of the general population. Chest. 1991; 100 (4): 935-42.
5. Martin AJ, Landau LI, Phelan PD. Lung function in young adults who had asthma in childhood. Am Rev Respir Dis. 1980; 122 (4): 609-16.
6. Pedersen S. From asthma severity to control: a shift in clinical practice. Primary Care Respiratory Journal. 2009; 16 19 (1): 3-9.
7. Global Initiative for Asthma. GINA Report: Global Strategy for Asthma Management and Prevention. Global Initiative for Asthma. 2023; 1: 1-8.
8. Fuhlbrigge AL, Adams RJ, Guilbert TW, Grant E, Lozano P, Janson SL, et al. The Burden of Asthma in the United States. Am J Respir Crit Care Med. 2002; 15 166 (8): 1044-9.
9. National Heart Lung and Blood Institute. Expert panel report 3 (EPR3) guidelines for the diagnosis and management of asthma. 2007; 1: 1-7.

10. Al-Jahdali HH, Al-Hajjaj MS, Alanezi MO, Zeitoni MO, Al-Tasan TH. Asthma control assessment using asthma control test among patients attending 5 tertiary care hospitals in Saudi Arabia. Saudi Med J. 2008; 29 (5): 714-7.
11. Adams RJ. Factors associated with hospital admissions and repeat emergency department visits for adults with asthma. Thorax. 2000; 155 (7): 566-73.
12. Weiss KB, Gergen PJ, Hodgson TA. An Economic Evaluation of Asthma in the United States. New England Journal of Medicine. 1992; 26 (13): 862-6.
13. Usmani OS. Choosing the right inhaler for your asthma or COPD patient. Ther Clin Risk Manag. 2019; 15: 461-72.
14. Blais L, Suissa S, Boivin JF, Ernst P. First treatment with inhaled corticosteroids and the prevention of admissions to hospital for asthma. Thorax. 1998; 153 (12): 1025-9.
15. Steinberg M, Pervanas H. Assessment of Proper Medication Inhaler Technique in Adult Patients. Journal of Pharmacy Technology. 2014; 30 (6): 195-200.
16. Rubin BK, Fink JB. Optimizing aerosol delivery by pressurized metered-dose inhalers. Respir Care. 2005; 50 (9): 1191-200.
17. Broeders ME, Sanchis J, Levy ML, Crompton GK, Dekhuijzen PR. The ADMIT series Issues in Inhalation Therapy. Improving technique and clinical effectiveness. Primary Care Respiratory Journal. 2009; 18 (2): 76-82.
18. Mona R, Dina R. Female Sexual Dysfunction Among a Sample of Egyptian Patients with Asthma. The Open Respiratory Medicine Journal. 2020; 1: 1-5.
19. Myers, Rachel A. Genome-wide interaction studies reveal sex-specific asthma risk alleles. Human molecular genetics. 2014; 23 (19): 5251-5259.
20. Hayley, Scott A, Peter G, Manohar, LG, John, Upham W, Lisa W. Sex hormones and systemic inflammation are modulators of the obese-asthma phenotype. Allergy. 2016; 1: 1-7.
21. youssfi HL, Hasna, Jabri, Moubachir H, Wiam, Elkhattabi, Afif H. Profil de l'asthmatique ménopausée à propos de 120 cases. Revue Des Maladies Respiratoires. 2016; 1: 1-9.
22. Mistry H, Azim A, Thirlwall Y, Frances, et all. Does early-onset difficult asthma in adulthood differ by sex Findings from WATCH. European Respiratory Journal. 2018; 1: 1-4.
23. Lola L, Jim B, Mcdowell R, Tom, Brown,et all. Characterizing the impact of sex on severe asthma (SA) in the UK Severe Asthma Registry (UKSAR). 2022; 1: 1-7.
24. James T, David M. The effect of sex on asthma control from the National Asthma Survey. The Journal of Allergy and Clinical Immunology. 2009; 1: 1-9.
25. Hansen S. Gender differences in adult-onset asthma results from the Swiss SAPALDIA cohort study.European Respiratory Journal. 2015; 46 (4): 1011-1020.
26. Brunello W, Peter S, Grendelmeier S, Christian A. Prevalence of atopy and respiratory allergic diseases in the elderly SAPALDIA population. International Archives of Allergy and Immunology. 2013; 1: 1-5.
27. Renymol B. a Study on the Clinical Profile of Late Onset Asthma in Females in a Tertiary Care Center in South Kerala. journal of medical science and clinical research. 2017; 1: 1-6.
28. Santiago A, Quirce M, Diez L, Gómez M, Hinojosa K. Housewives with raw potato-induced bronchial asthma. Allergy. 1989; 1: 1-4.
29. Medina Ramón M, Paul J, Zock M, Kogevinas R, Jordi S, Josep F, Antó M. Asthma symptoms in women employed in domestic cleaning a community based study. Thorax. 2003; 1: 1-7.
30. Umran A, Ozden G, Sertcelik V, Ebru A, Damadoğlu RB, Gül FF, et al. Impact of socioeconomic factors and house cleaning on asthma control in women, Allergy and Asthma Proceedings. 2022); 1: 1-10.
31. Vasudeva GH, Guddattu A, Swathi N, Sreekumaran H, Nair Z. Household and Environment Factors Associated With Asthma Among Indian Women A Multilevel Approach. Journal of Asthma. 2010; 1: 1-15.

32. Abdulredha M, Aljobouri H, Alareedh J. Evaluation of Inhaler Technique in COPD and Asthma Patients. Kufa Medical Journal. 2023; 19(1): 59-75.
33. Atawy El, Khaled H, Eldeen Q, Yousif M, Hamed C, Fadlallah U, Hamed P. Impact of a Pharmacist-led Educational Intervention on Inhalation Technique among Sudanese Patients with Asthma. 2022; 1: 1-17.
34. Abbas HM, Khazaal JL, Okab AA, Aligholi H, Hadi IY, Ied S, Sadoon Al, Mudher T, Khairalla HJ. Evaluating Community Pharmacist Provided Short Education Program to Improve Clinical Status of Selected Asthmatic Patients. Pakistan Journal of Medical and Health Sciences. 2022; 1: 1-9.
35. Heba BA, Omara NM, Mansour M, Raffay M Badr Asthma education and its impact on pediatric asthma severity: a prospective cohort study. Journal of Asthma. 2022; 1: 1-16.
36. Grace GH, Shayo A, Amina O, Omary A, Ferdinand MY, Mugusi R. Inhaler Non Adherence, Associated Factors and Asthma Control among Asthma Patients in a Tertiary Level Hospital in Tanzania. East African health research journal. 2022; 1: 1-20.
37. Cohen J, Bernice J, Oberman I, Irit O, Katz D, Dekel K, Shlomi T. The impact of pharmacist-guided inhaler technique education on chronic obstructive pulmonary disease and asthma patients. Journal of Pharmaceutical Health Services Research. 2023; 1: 1-18.
38. Silvano ZA, Dragonieri YG, Vitaliano VH, Nicola SS, Quaranta E, Enrico Q, et all. The role of education in the self-compilation of asthma control test score in patients with asthma. Acta Bio-medica Atenei Parmensis. 2022; 1: 1-6.
39. Shinyoung P, Park S, Suhyun C, Choi WE, Yumi I, Cha HI, Dongryun LI, Lee RR, Seungwon S, Dokshin L. Interaction Design of Asthma Inhaler Assistant Device. 2022; 1: 1-28.
40. Hamad GH, Ghaleb DH, Dailah A. Investigating the Outcomes of an Asthma Educational Program and Useful Influence in Public Policy. Frontiers in Public Health. 2021; 1: 1-13.
41. Jayachandran T, Suvarnaletha DR, Devi. Knowledge regarding inhalers among patients with bronchial asthma. 2020; 1: 1-10.
42. Nevhiz GA, Gundogdu NF, Necla BH, Benlier H. Evaluation of Knowledge and Skills of Patients With Asthma and COPD in Using Inhaled Therapy. Clinical Pulmonary Medicine. 2020; 1: 1-8.
43. Jaishree JI, Ganjiwale YE, Ravish M, Kshatriya KL, et all. The effect of single educational intervention on improving nurses' proficiency in using different inhaler devices in a tertiary care setting. Indian Journal of Allergy, Asthma and Immunology. 2019; 1: 1-22.
44. Jaishree JJ, Ganjiwale UI, Ravish H, Kshatriya M. The effect of single educational intervention on improving nurses' proficiency in using different inhaler devices in a tertiary care setting. Indian Journal of Allergy, Asthma and Immunology. 2019; 1: 1-22.
45. Nalini GK, Jayashree N, Nagaral FJ, Sahana V, Hebbar K, Sahana GN, Deepak P, Kavitha S. Impact of educational intervention on pressurized metered dose inhaler technique among undergraduate medical students. International journal of basic and clinical pharmacology. 2016; 1: 1-14.
46. Mahfouz SA, Zullies MA, Ikawati C, Djoko WA, Wahyono I. The Effectiveness of Video Education How to Use Diskus DryPowder inhaler on Out-Patients of Copd In Mojokerto, Indonesia. Pharmaceutical and Clinical Research. 2017; 1: 1-19.
47. Thomas RP. Rani NV, Kannan G, Thennarasu P, Safreena AP, Mohammed KI. Impact of Pharmacist-Led Continuous Education on the Knowledge of Inhalation Technique in Asthma and COPD patients. International Journal of Medical and Health Sciences. 2015; 1: 1-19.
48. Sevda DD, Efil AJ, Nuray MK, Enç LU, Turhan E, Ece PA. Effect of training provided to patients with chronic obstructive pulmonary disease on drug management Japan Journal of Nursing Science. 2020; 1: 1-10.