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Original article

Effect of Inhaler Technique Education on Acute Exacerbations and Disease Control in Patients with Asthma and COPD

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Abstract Inhaled therapy is the most widely used treatment for patients with asthma and chronic obstructive pulmonary disease(COPD) but most of them do not use their inhalers correctly. Inhaler technique education may improve clinical outcomes. The objectives of this study were to: (1) evaluate the effect of inhaler technique education, and (2) investigate factors associated with incorrect inhaler technique among patients with asthma or COPD who had history of severe exacerbations in Sawanpracharak hospital. A quasi-experimental study was conducted in 42 patients with asthma or COPD who had history of severe exacerbations. Inhaler technique was assessed at baseline. All patients were trained on how to use the inhaler with placebo devices provided by pulmonologist every 3 months for 1-year follow-up. Severe exacerbations and hospitalizations, ACT, CAT and mMRC were recorded. Among 42 patients, 21 were asthma (50%) and, 25 were COPD (64.1%) with mean age of 61.35±15.83 years. A total of 38 patients (90.48%) used inhaler devices incorrectly at baseline. After receiving inhaler technique education, percentage of incorrect inhaler technique decreased from 90.48% to 17.95% ($p<0.05$). Severe exacerbations reduced from 4.21±5.23/year to 1.14±2.59/year ($p<0.05$) and hospitalizations reduced from 2.02±3.41/year to 0.59±1.74/year ($p<0.05$). ACT for asthma and CAT for COPD patients were significantly improved but there was no significant difference in mMRC. Patients who never received inhaler technique education by physician are associated with incorrect inhaler technique (OR=11.25, 95% CI 1.26-123.24; $p<0.05$). Incorrect inhaler technique is common in this study. Inhaler technique education provided by pulmonologist during OPD visit could reduce inhaler technique errors, severe exacerbations, hospitalizations and symptoms. This study demonstrates the importance of inhaler technique education during OPD visit. Physician should evaluate and provide instructions on correct inhalation technique. Careful monitoring and inhaler technique education are important for asthma and COPD treatment, particularly in frequent exacerbators.

***Keywords*: inhaler technique; asthma; COPD**

Introduction

Asthma and chronic obstructive pulmonary disease (COPD) are chronic respiratory diseases causing morbidity and mortality throughout the world.[1] Asthma and COPD affect about 7.8-19.7% of the global population, with many patients still suffer from uncontrolled asthma and COPD symptoms.[2-4] In Thailand, 2.91% of the adult population have asthma and 5% have COPD.[5,6] Inhaled therapy is the mainstay of asthma and COPD treatment. There are the avaibility of effective inhaler medications and disease management guidelines but patients's inhaler technique has not been improved.[2,3,7] Inhaler devices include nebulizers, pressurized metered-dose inhaler (pMDI), soft-mist inhalers and single-dose and multi-dose dry powder inhalers (DPIs).[3] For DPI, optimal inspiratory flow is necessary to guarantee lung deposition of medication.[8] The prevalence of inhaler errors still high over the past 40 years.[7] Poor inhaler techniques are associated with decrease drug delivery and poor disease control.[9] Systematic reviews found that 4.0-94.0% of asthma and COPD patients do not use DPIs correctly.[10] In addition, the majority of health care professionals demonstrated inadequate knowledge of proper use of inhalers.[11]

Incorrect inhaler technique is common and often associated with poor disease control, exacerbation, hospitalization, and the need for oral steroids and antimicrobials in asthma and COPD.[12] A study from Korea identified that education program intervention for chronic airway diseases by primary care physicians was associated with improvement of knowledge about the disease, inhaler use, and quality of life.[13] In Thailand, information regarding the use of inhalers is limited. A previous study revealed about half of asthma patients routinely treated by pulmonologists used their inhaler incorrectly.[14] There is no study conducted to assess the effect of inhaler technique education on clinical outcomes in patients with asthma and COPD. Inhaler technique education by pulmonologist during OPD visit may reduce exacerbation and improve clinical outcomes in these patients.

Therefore, the proposes of this study were to evaluate the effect of inhaler technique education with a placebo training device provided by pulmonologist during OPD visit and to investigate factors associated with incorrect inhaler technique among patients with asthma and COPD who had history severe exacerbation.

Materials and Methods

Setting and study population

This was a quasi-experimental study. It was conducted as a pre- and post-interventional study without control group in outpatient pulmonary clinic at Sawanpracharak hospital, a 661-bed tertiary hospital in Thailand, from April 2019 to October 2020. Asthma or COPD patients who had history one or more severe exacerbation in the previous year, visited pulmonary outpatient clinic, aged 15 years or older and prescribed with any kind of inhaled medications for at least 1 month were asked to participate. All patients were in a stable condition. Patients who had recent severe exacerbation or serious illness, including myocardial infarction, cardiac arrhythmia, heart failure, cerebral infarction, pulmonary embolism, hemoptysis, pulmonary infection, pneumothorax within 8 weeks or unable to complete the questionaires were excluded. Prospective power calculations indicated that the overall sample size of 37 patients was required to

detected 50% decrease of COPD or asthma exacerbation (80% power, α=0.05, effect size=0.7). After account for 10% dropout, this study aimed to enroll 41 patients.[15] Informed consent was obtained from each participated patient. This research protocol was approved by the ethic committee of Sawanpracharak hospital.

Interventions

The interventions were performed at baseline and after 3, 6, 9 and 12 months for 1-year follow-up. Severe exacerbation and hospitalization form asthma or COPD, asthma control test (ACT), COPD assessment test (CAT) and modified medical research council score (mMRC) were recorded. Electronic medical records of all patients were reviewed before and after the interventions to evaluate the clinical outcomes.

At the first visit, patients's information including age, gender, educational level, smoking status, diagnosis, duration of disease, history of exacerbation and hospitalization in the previous year, duration of inhaler used, number and type of inhaler devices and previous inhaler technique education were recorded. Pulmonologist examined patients and assessed their disease severity. The measurements of peak inspiratory flow rate (PIFR) for different inhaler devices were performed by using In-Check DIAL device. A total of three consecutive measurements of PIFR for each device were performed by attending nurse. The average value of PIFR from three measurements was reported.[8,16] Symptom control of asthma was assessed by ACT.[2] Assessment of symptoms for COPD was achieved by using CAT and mMRC.[3] Patients were prescribed with inhaled medications in accordance with their disease severity, the ability to generate inspiratory flow, the capacity to handle the device and drug availability.[17] At baseline, enrolled patients were asked to demonstrate their inhaler devices step by step to evaluate their baseline technique with standardized checklists and maufacturers' recommendations and assessed by pulmonologist.[18] Incorrect inhalation technique was defined if the patients performed at least one critical error. Patients were trained on how to use the inhaler and received inhaler technique education with placebo training device provided by pulmonologist. They were evaluated every 3 months for 1-year follow-up by pulmonologist during OPD visit.

Statistical analysis

Continuous variables such as age, body mass index (BMI), duration of inhaler use, duration of disease, pulmonary functions, frequency of severe exacerbation and hospitalization were presented as mean value with standard deviation and were compared using Student's t-test. Categorical variables such as diagnosis, education level, sex, frequent exacerbator, type of inhaler use and correction of inhaler technique were presented with frequency per category and compared by using Chi-square test or Fisher-exact test to identify the association between patients characteristics and incorrect inhaler technique. The potential risk factors of an incorrect inhaler technique were analyzed using univariated logistic regression analysis. Effect sizes were expressed as odds ratios (OR) with 95% confidence intervals (CI). Comparison of clinical outcomes between pre-and post interventions were analyzed using a paired t-test with the significant level of p-value <0.05. All analyses were performed using STATA version 14.1 (StataCorp LP).

Results

A total of 42 patients with asthma or COPD were included in the study. All of them received regular follow-up every 3 months for 1 year. Baseline patient characteristics are presented in Table 1. The mean age was 61.35±15.83 years, and 21 (50.00%) were 60 years or older. Over two-third of patients (71.43%) had education below secondary school and 54.76% of patients were ex-smoker. The mean BMI was 25.01±7.22 kg/m^2. Half of them were male, 21 (50.00%) were diagnosed asthma and 25 (64.10%) were diagnosed COPD. Allergic rhinitis was the most common comorbidity (41.18%). The mean duration of disease was 7.38±3.01 years. Patients had used their inhaler for an average of 2.05±2.78/years. The mean FEV_1 and ratio of FEV_1/FVC were 1.82±0.82 L and 0.72±0.18, respectively. All patients had a history of severe exacerbation in the previous year (4.21±5.23/year), most of them were frequent exacerbators (92.86%) and had history of hospitalization from asthma or COPD (71.43%).

Baseline assessment of inhaler devices and inhaler techniques are presented in Table 2. The pMDI was the most commonly used (n=27, 64.29%), followed by dry power inhaler, turbuhaler (n=19, 45.24%), handihaler (n=18, 42.86%) and accuhaler (n=15, 35.71%). There were 27 (64.29%) patients who used multiple inhaler devices and 11 (26.19%) pa-

Table 1 Baseline characteristics of asthma or COPD patients (n=42)

Characteristics		Number	%
Male		21	50.00
Education level	No education	5	11.90
	Primary school	25	59.52
	Secondary school	8	19.05
	Higher education	4	9.52
Mean age(years)		61.35±15.83	
	Age>60 years	21	50
Smoking	Non-smoker	19	45.24
	Ex-smoker	23	54.76
Mean BMI (kg/m^2)		25.01±7.22	
	BMI <25 kg/m^2	21	50
Diagnosis	Asthma	21	50
	COPD	25	64.1
Comorbid disease	ACOS	4	11.76
	Allergic rhinitis	14	41.18
	Bronchiectasis	6	17.65
	Diabetes mellitus	4	11.76
	Hypertension	2	5.88
	Coronary artery disease	1	2.94
	CPFE	1	2.94
	Parkinson disease	1	2.94

Table 1 Baseline characteristics of asthma or COPD patients (n=42)(cont.)

Characteristics	Finding
Mean duration of disease (years)	7.38±3.01
Mean duration of inhaler use (years)	2.05±2.78
Mean ratio of FEV_1/FVC	0.72±0.18
Mean FEV_1 (Liter)	1.82±0.82
Mean percent of predicted FEV_1%	78.5±27.78
Mean peak inspiratory flow rate (L/min)	55.79±22.06
Mean frequency of severe exacerbation in the previous year	4.21±5.23
Hospitalization from asthma/COPD exacerbation in the previous year	30±71.43
Mean frequency of hospitalization from exacerbation in the previous year	2.02±3.42
Frequent exacerbator (Number/%)	26 92.86

Note: Data are presented as number and percentage or mean±SD.

Abbreviations: COPD, chronic obstructive pulmonary disease; ACOS, Asthma-COPD overlapping syndrome; CPFE, combined pulmonary fibrosis and emphysema; BMI, body mass index; FEV_1, force expiratory volume in 1 second; FVC, force vital capacity

Table 2 Baseline assessment of inhaler devices and inhaler techniques (n=42)

Variables	number	%
Type of inhaler		
pMDI	27	64.29
pMDI with spacer	1	2.38
accuhaler	15	35.71
turbuhaler	19	45.24
rapihaler	3	7.14
handihaler	18	42.86
ellipta	3	7.14
SMI	4	9.52
Nebulizer	1	2.38
Oral medication (xanthine and/or LRTA)	28	66.67
Use of multiple devices	27	64.29
Received inhaler technique education by physicians	11	26.19
Any critical error	38	90.48
Open device correctly	42	100.00
Shake inhaler thoroughly for MDI	15	78.95
Hold the inhaler correctly	39	92.86
Load the inhaler correctly for DPI	28	70

Table 2 Baseline assessment of inhaler devices and inhaler techniques (n=42) (cont.)

Variables	number	%
Enough breath out before inhalation	6	14.29
Good understanding of manner of inhalation	32	76.19
Hold breath for at least 5 second after inhalation	19	45.24
Breath out away from mouthpiece	36	85.71
Rising mouth after inhalation use	38	95

Abbreviations; pMDI - pressurized metered dose inhaler; SMI - soft mist inhaler; LRTA - leukotriene receptor antagonists; DPI - dry powder inhaler

tients had been received inhaler technique education by physicians. The prevalence of incorrect inhaler technique was 90.48% at baseline. The most common errors in all devices were no full exhalation to residual volume (85.71%) and no breath holding at least 5 seconds (54.76%).

According to the univariate regression analysis, patients who never received inhaler technique education by physicians were associated with incorrect inhaler technique (OR=11.25, p<0.05, 95%CI 1.26-123.24) (Table 3). The frequent exacerbators were over two time to performed incorrect inhaler technique,

Table 3 Risk factors for incorrect inhaler technique by univariate logistic regression analysis before received inhaler technique education (n = 38)

Variables	Number	%	OR	p-value	95%CI
Age ≥60 years (n=21)	19	90.48	1.0	1.00	0.13-7.85
Male (n=21)	20	95.24	3.33	0.31	0.31-34.98
BMI< 25 kg/m^2 (n=21)	18	85.71	0.3	0.31	0.02-3.14
Diagnosis					
COPD (n=25)	23	92.00	1.91	0.50	0.23-15.35
Asthma (n=21)	18	85.71	0.3	0.31	0.028-3.14
Low education level (≤6 years) (n=30)	28	93.33	2.8	0.33	0.34-22.60
Use of multiple devices (n=27)	24	88.89	0.57	0.63	0.05-6.04
FEV_1 <50% of predicted (n=6)	4	66.67	0.16	0.11	0.01-1.54
PIFR <30 L/min (n=7)	7	100.00	1	NA	NA
mMRC ≥2 (n=9)	9	100.00	1	NA	NA
Frequent exacerbation ≥2/year (n=28)	26	92.86	2.16	0.46	0.27-17.27
Never received inhaler technique education by physician (n=31)	30	96.77	11.25	0.048*	1.02-123.24

Abbreviations: BMI, body mass index; FEV_1, force expiratory volume in 1 second; PIFR; peak inspiratory flow rate; mMRC, modified Medical Research Council scores; ACT, asthma control test; OR, Odds ratio; CI, confident interval; NA, not applicable

* Statistically significant (p<0.05)

but this result was not statistically insignificant (OR 2.16, p=0.46, 95% CI 0.27-17.27).

The comparison of clinical outcomes between baseline and after receiving inhaler technique education with placebo device training provided by pulmonologist for 1-year follow-up are presented in Table 4. The percentages of patients who performed incorrect inhalation technique decreased from 90.48% to 17.95% (p<0.05). The percentages of patients who performed correct inhaler technique in each visit were significantly increased after 6-months of follow-up period (p<0.05) (Figure 1). There was a significant reduction in the frequency of severe exacerbations from 4.21±5.23/year to 1.14±2.59/year (p<0.05). Hospitalizations from asthma or COPD were decreased from 2.02±3.41/year to 0.59±1.74/year (p<0.05). ACT scores were increased from 18±5.86 to 22.94±2.27 (p<0.05) for asthma. CAT scores were decreased from 15±6.17 to 11.68±3.15 (p<0.05) but no there was no significant differences regarding of mMRC score (p=0.36) for COPD (Table 4).

Discussion

This study included 42 patients with asthma or COPD who had history of severe exacerbation in the previous year. The study aimed to assess inhaler technique and measure clinical outcomes after inhaler technique education for 1-year follow-up in a tertiary hospital. About 90.4% of the patients performed incorrect inhaler technique at baseline. The majority of patients (73.81%) did not receive inhaler technique education by physicians. The most common errors in all devices were no full exhalation to residual volume (85.71%) and no breath holding at least 5 seconds (54.76%). This finding is similar to previous study, a quasi-experimental study showed 69% of asthma, COPD and ACO made at least one inhaler technique error.[19] Systematic review showed that between 4% and 94% of COPD or asthma patients did not use their inhalers correctly.[10] Patients with incorrect inhalation technique had more exacerbations in the previous year.[19]

Incorrect inhaler use in patients with asthma and COPD is high for all type of devices.[7] The most

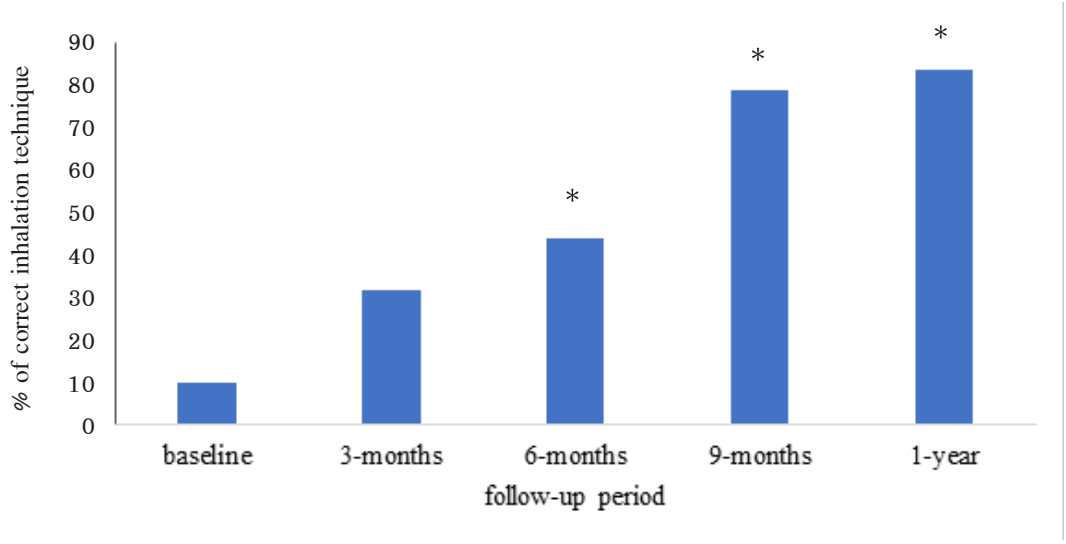
Table 4 Comparisons of clinical outcomes at baseline and 1-year follow up after received inhaler technique education in 42 patients with asthma or COPD

Clinical outcomes	Baseline	1-year follow-up	p-value
Any critical error, n (%)	38 (90.48)	7 (17.95)	<0.001
Mean frequency of severe exacerbation/year	4.21±5.23	1.14±2.59	<0.001
Mean hospitalization from asthma/COPD exacerbation/year	2.02±3.41	0.59±1.74	<0.001
Mean ACT for asthma patients	18±5.86	22.94±2.27	0.002
Mean CAT for COPD patients	15±6.17	11.68±3.15	0.019
Mean mMRC for COPD patients	1.41±0.91	1.23±0.43	0.360

Note: Data are presented as n(%) or mean±SD. Comparison of clinical outcomes between pre-and post-interventions were analyzed using a paired t-test with the significant level of p-value <0.05.

Abbreviations: ACT, Asthma control test; CAT, COPD assessment test; mMRC, modified medical research council score

Figure 1 Comparison of percentage of correct inhaler technique between baseline and every 3-months for 1-year follow up after received inhaler technique education in 42 patients with asthma or COPD



Note: * p<0.05 vs baseline

common errors in all devices are no full exhalation to residual volume and no breath holding.[7,11,14,19] Univariate analysis showed that patients who never received inhaler technique education by physicians were associated with incorrect inhaler technique (OR=11.25, p<0.05, 95%CI 1.26-123.24). Patients who never received inhalation instruction made a significantly more errors.[20] Lack of regular follow-up and no education about disease were associated with improper use of inhaler device in these patients.[21]

The prevalence of incorrect inhaler technique is considered high due to several reasons. First, this study recruited asthma or COPD patients who have history ≥1 severe exacerbation in the previous year. Most of them were frequent exacerbators (92.86%) and with history of hospitalizations from asthma or COPD (71.43%). Previous studies reported that patients with poor inhaler technique are more likely to be admitted to hospital.[18,19] Second, all patients reported that they knew how to use their inhaler devices and received counselling on inhalers but only 11(26.19%) patients received inhaler technique education by physicians. A previous study found that only 27.7% of physicians always checked the patient's inhalation technique when prescribing a new inhaler and only 14.2% physicians had an adequate knowledge of inhaled therapy.[22] Systematic review showed that the majority of health care professionals had inadequate knowledge of proper use of inhaler.[11] Health care professionals do not routinely demonstrate inhaler technique to patients; this practice may contribute to inhaler technique errors and associated with increased health-care resource use and poor clinical control.[12]

Unlike previous studies, the patient's characteristics of sex, education level, severity of obstruction and diagnosis were not associated with incorrect inhaler technique.[19,23-25] Moreover, no association was found between patients using multiple inhaler devices and incorrect inhaler technique.[20]

At baseline assessment, if patients have inhaler

technique errors, they will receive inhaler technique education using placebo devices similar to their devices and follow-up every 3 months for 1 year. The inhaler technique education for chronic respiratory disease is important. This study demonstrates positive effect of inhaler technique education on clinical outcomes. Figure 1 showed the percentages of patients who performed correct inhaler technique in each visit were significantly increased overtime of follow-up period. Moreover, severe exacerbation and hospitalization and symptoms scores assessed by ACT for asthma and CAT for COPD were improved. Improvement of patients' inhalation technique could lead to a better long-term disease control and improved quality of life.[26,27] Systematic review found that the major predictors for successful inhaler education were low baseline performance, outpatients setting and short follow-up time.[28]

The strength of this study was that the study was carried out in asthma or COPD patients who had history severe exacerbation. The majority of patients were frequent exacerbators (92.86%) and performed incorrect inhaler technique at baseline (90.4%). All patients received regular follow-up every 3 months for 1 year. The length of follow-up was longer than previous study.[27] Regular follow-up and individual inhaled drug counselling might be one of the potential explanations for the improvement.[29] In addition, pulmonologist prescribed inhaled medications appropriately to their disease severity and factors including the ability to generate adequate inspiratory flow, the capacity to handle the device, coordination with inspiratory effort and good patient compliance might also help improve the outcomes. This finding confirms a recommendation to educate patients on their inhaler instead of switching inhalers.[30] Coaching can be used to improve inhaler technique, reduce symptoms and acute health care utilization in patients with asthma and COPD.[31]

This study had some limitations. First, the sample size of the study was considerably small, some of patient's factors such as age, peak inspiratory flow and dyspnea score were not associated with incorrect inhaler technique. Second, patients were not randomized to usual or intervention group because of the ethical problems. Clinical outcomes were compared between baseline and 1 year later. Third, the accuracy of the results may have been limited by Howthorne effect, the behaviour changes of participants in the study and regular follow-up by pulmonologist. This effect will not be sustained by establishing a cohort time of 1 year. Fourth, inhaler medication adherence was measured by using prescription data and patient self-report during the follow-up visit but these methods did not confirm drug intake. Electronic monitors is more preferable method for assessing patient's adherence, but widespread use has been limited in clinical trials.[31]

In conclusion, this study demonstrates a high prevalence of incorrect inhaler technique among patient with asthma or COPD who have history of severe exacerbation in the previous year. Patients who never received inhaler technique education by physicians are associated with incorrect inhaler technique. Inhaler technique education could reduce severe exacerbations, hospitalizations and symptoms. Evaluation and provision of instructions on correct inhalation technique are recommended during OPD visit. Careful monitoring and inhaler technique education, particularly in frequent exacerbators are important for asthma and COPD treatment.

References

1. World Health Organization. Global surveillance, prevention and control of chronic respiratory diseases : a comprehensive approach [Internet]. 2007 [cited 2020 Jul 17]. Available from: https://www.who.int/publications/i/item/global-surveillance-prevention-and-control-of-chronic-respiratory-diseases
2. Global Initiative for Asthma. Global strategy for asthma management and prevention (2020 update) [Internet]. 2020 [cited 2020 Jul 15]. Available from: www.ginasthma.org
3. Global Initiative for Chronic Obstructive Lung Disease. Global strategy for prevention, diagnosis and management of chronic obstructive pulmonary disease (2020 report) [Internet]. 2020 [cited 2020 Jul 16]. Available from: https://goldcopd.org/gold-reports/
4. Boonsawat W, Thompson PJ, Zaeoui U, Samosorn C, Acar G, Faruqi R, et al. Survey of asthma management in Thailand - the asthma insight and management study. Asian Pac J Allergy Immunol 2015;33(1):14-20.
5. Regional CWG. COPD prevalence in 12 Asia-Pacific countries and regions: projections based on the COPD prevalence estimation model. Respirology 2003;8(2): 192-8.
6. Dejsomritrutai W, Nana A, Chierakul N, Tscheikuna J, Sompradeekul S, Ruttanaumpawan P, et al. Prevalence of bronchial hyperresponsiveness and asthma in the adult population in Thailand. Chest 2006;129(3):602-9.
7. 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.
8. van der Palen J. Peak inspiratory flow through diskus and turbuhaler, measured by means of a peak inspiratory flow meter (in-check DIAL). Respir Med 2003;97(3):285-9.
9. Cochrane MG, Bala MV, Downs KE, Mauskopf J, Ben-Joseph RH. Inhaled corticosteroids for asthma therapy: patient compliance, devices, and inhalation technique. Chest 2000;117(2):542-50.
10. Lavorini F, Magnan A, Dubus JC, Voshaar T, Corbetta L, Broeders M, et al. Effect of incorrect use of dry powder inhalers on management of patients with asthma and COPD. Respir Med 2008;102(4):593-604.
11. Plaza V, Giner J, Rodrigo GJ, Dolovich MB, Sanchis J. Errors in the use of inhalers by health care professionals: a systematic review. J Allergy Clin Immunol Pract 2018; 6(3):987-95.
12. 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.
13. Lee JY, Yoo KH, Kim DK, Kim SH, Kim TE, Kim TH, et al. Effects of educational interventions for chronic airway disease on primary care. J Korean Med Sci 2016;31(7):1069-74.
14. Pothirat C, Chaiwong W, Limsukon A, Phetsuk N, Chetsadaphan N, Choomuang W, et al. Real-world observational study of the evaluation of inhaler techniques in asthma patients. Asian Pac J Allergy Immunol 2019.
15. Takemura M, Mitsui K, Ido M, Matsumoto M, Koyama M, Inoue D, et al. Effect of a network system for providing proper inhalation technique by community pharmacists on clinical outcomes in COPD patients. Int J Chron Obstruct Pulmon Dis 2013;8:239-44.
16. Kawamatawong T, Khiawwan S, Pornsuriyasak P. Peak inspiratory flow rate measurement by using In-Check DIAL for the different inhaler devices in elderly with obstructive airway diseases. J Asthma Allergy 2017; 10:17-21.

17. Dekhuijzen PN, Vincken W, Virchow JC, Roche N, Agusti A, Lavorini F, et al. Prescription of inhalers in asthma and COPD: towards a rational, rapid and effective approach. Respir Med 2013;107(12):1817-21.
18. Batterink J, Dahri K, Aulakh A, Rempel C. Evaluation of the use of inhaled medications by hospital inpatients with chronic obstructive pulmonary disease. Can J Hosp Pharm 2012;65(2):111-8.
19. Nobre Pereira M, Marques T, Areias V, Guerreiro C, Cunha K, Ramos H. Screening of inhalation technique and treatment adherence in asthma, COPD and ACO patients. Pulmonology 2021;27(4):375-80.
20. Rootmensen GN, van Keimpema AR, Jansen HM, de Haan RJ. Predictors of incorrect inhalation technique in patients with asthma or COPD: a study using a validated videotaped scoring method. J Aerosol Med Pulm Drug Deliv 2010;23(5):323-8.
21. 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.
22. Plaza V, Sanchis J, Roura P, Molina J, Calle M, Quirce S, et al. Physicians' knowledge of inhaler devices and inhalation techniques remains poor in Spain. J Aerosol Med Pulm Drug Deliv 2012;25(1):16-22.
23. Goodman DE, Israel E, Rosenberg M, Johnston R, Weiss ST, Drazen JM. The influence of age, diagnosis, and gender on proper use of metered-dose inhalers. Am J Respir Crit Care Med 1994;150(5 Pt 1):1256-61.
24. Wieshammer S, Dreyhaupt J. Dry powder inhalers: which factors determine the frequency of handling errors? Respiration 2008;75(1):18-25.
25. Pothirat C, Chaiwong W, Phetsuk N, Pisalthanapuna S, Chetsadaphan N, Choomuang W. Evaluating inhaler use technique in COPD patients. Int J Chron Obstruct Pulmon Dis 2015;10:1291-8.
26. Dudvarski Ilic A, Zugic V, Zvezdin B, Kopitovic I, Cekerevac I, Cupurdija V, et al. Influence of inhaler technique on asthma and COPD control: a multicenter experience. Int J Chron Obstruct Pulmon Dis 2016;11:2509-17.
27. Harnett CM, Hunt EB, Bowen BR, O'Connell OJ, Edgeworth DM, Mitchell P, et al. A study to assess inhaler technique and its potential impact on asthma control in patients attending an asthma clinic. J Asthma 2014;51(4):440-5.
28. Klijn SL, Hiligsmann M, Evers S, Roman-Rodriguez M, van der Molen T, van Boven JFM. Effectiveness and success factors of educational inhaler technique interventions in asthma & COPD patients: a systematic review. NPJ Prim Care Respir Med 2017;27(1):24.
29. Park HJ, Byun MK, Kim HJ, Ahn CM, Rhee CK, Kim K, et al. Regular follow-up visits reduce the risk for asthma exacerbation requiring admission in Korean adults with asthma. Allergy Asthma Clin Immunol 2018;14:29.
30. Melani AS, Zanchetta D, Barbato N, Sestini P, Cinti C, Canessa PA, et al. Inhalation technique and variables associated with misuse of conventional metered-dose inhalers and newer dry powder inhalers in experienced adults. Ann Allergy Asthma Immunol 2004;93(5):439-46.
31. George M. Adherence in Asthma and COPD: New strategies for an old problem. Respir Care 2018;63(6):818-31.

บทคัดย่อ: ผลของการให้ความรู้เรื่องเทคนิคการสูดยาเพื่อการควบคุมอาการกำเริบเฉียบพลันในผู้ป่วยโรคหืดและโรคปอดอุดกั้นเรื้อรัง

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วารสารวิชาการสาธารณสุข 2565;31(3):550-61.

การใช้ยาสูดเป็นยาหลักในการรักษาผู้ป่วยโรคหืดและโรคปอดอุดกั้นเรื้อรัง ข้อมูลจากหลายการศึกษาพบว่าผู้ป่วยส่วนใหญ่ใช้ยาสูดไม่ถูกต้อง การให้ความรู้เรื่องเทคนิคการสูดยาน่าจะช่วยควบคุมอาการและลดการกำเริบเฉียบพลันในผู้ป่วยโรคหืดและโรคปอดอุดกั้นเรื้อรัง การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาผลของการให้ความรู้เรื่องเทคนิคการสูดยากับการควบคุมอาการและการกำเริบเฉียบพลัน และศึกษาปัจจัยที่มีผลต่อการใช้ยาสูดไม่ถูกต้องในผู้ป่วยโรคหืดหรือปอดอุดกั้นเรื้อรังที่มีประวัติกำเริบเฉียบพลันในโรงพยาบาลสวรรค์ประชารักษ์ วิธีการศึกษาเป็นรูปแบบการศึกษากึ่งทดลองในผู้ป่วยโรคหืดและปอดอุดกั้นเรื้อรังที่มีประวัติกำเริบเฉียบพลันในปีที่ผ่านมาจำนวน 42 ราย แพทย์ประเมินและสาธิตวิธีการสูดยาโดยใช้อุปกรณ์ยาหลอก ติดตามผลทุก ๆ 3 เดือน เป็นระยะเวลา 1 ปี เก็บข้อมูลประวัติการกำเริบเฉียบพลันและการเข้ารับการรักษาในโรงพยาบาล ประเมินอาการโดยใช้แบบสอบถาม ACT CAT และ mMRC เปรียบเทียบผลลัพธ์ทางคลินิกก่อนและหลังเข้าร่วมการศึกษา มีผู้ป่วยเข้าร่วมการศึกษา 42 ราย โรคหืด 21 ราย (ร้อยละ 50.0) โรคปอดอุดกั้นเรื้อรัง 25 ราย (ร้อยละ 64.1) อายุเฉลี่ย 61.35±15.83 ปี มีผู้ป่วยที่ใช้ยาสูดไม่ถูกต้อง 38 ราย (ร้อยละ 90.48) หลังได้รับความรู้เรื่องเทคนิคการสูดยา ติดตามเป็นระยะเวลา 1 ปี สัดส่วนของผู้ป่วยที่ใช้ยาสูดไม่ถูกต้องลดลงจากร้อยละ 90.48 เป็นร้อยละ 17.95 ($p<0.05$) อัตราการกำเริบเฉียบพลันลดลงจาก 4.21±5.23 ครั้ง/ปี เป็น 1.14±2.59 ครั้ง/ปี ($p<0.05$) อัตราการเข้ารับการรักษาในโรงพยาบาลลดลงจาก 2.02±3.41 ครั้ง/ปี เป็น 0.59±1.74 ครั้ง/ปี ($p<0.05$) การประเมินอาการโดยใช้ ACT และ CAT ดีขึ้นอย่างมีนัยสำคัญทางสถิติ ผู้ป่วยที่ไม่เคยได้รับการประเมินและการแนะนำการใช้ยาสูดจากแพทย์เป็นปัจจัยที่สัมพันธ์กับการใช้ยาสูดไม่ถูกต้อง (OR=11.25, 95%CI 1.26-123.24; $p<0.05$) โดยสรุป การศึกษานี้พบผู้ป่วยโรคหืดและโรคปอดอุดกั้นเรื้อรังส่วนใหญ่ใช้ยาสูดไม่ถูกต้อง การประเมินเทคนิคการสูดยาและการให้ความรู้เรื่องการสูดยาในระหว่างการตรวจผู้ป่วยนอกโดยแพทย์มีความสำคัญ ช่วยลดการใช้ยาสูดไม่ถูกต้อง ลดอัตราการกำเริบเฉียบพลัน ลดอัตราการนอนโรงพยาบาล และควบคุมอาการของโรคได้ดีขึ้น ดังนั้นเราควรประเมินและให้ความรู้เทคนิคการสูดยาแก่ผู้ป่วยโรคหืดและปอดอุดกั้นเรื้อรังโดยเฉพาะอย่างยิ่งในรายที่มีประวัติกำเริบเฉียบพลันบ่อย

คำสำคัญ: **เทคนิคการสูดยา; โรคหืด; โรคปอดอุดกั้นเรื้อรัง**