

Original Articles

Effectiveness of The Active Cycle Breathing Technique on The Peak Expiratory Flow Rate (PEFR) in Asthma Patient



Julvainda Eka Priya Utama^{1*}

¹STIKES Karya Husada Semarang, Semarang, Indonesia

Article Info	Abstract
Article history: Received: 16 December 2019 Accepted: 15 February 2020	<i>Introduction:</i> The Peak Expiratory Flow Rate (PEFR) is a person maximum expiratory airflow measurement. The active cycle breathing technique is a breathing exercise focus on release the abnormal lung secretion by increase the expiration power. The aim of this study was to analyze the effectiveness of the active cycle breathing technique on the PEFR in asthma patient.
Keywords: the active cycle breathing technique, peak expiratory flow rate, asthma	<i>Methods:</i> Design of this study was quasi-experimental with single pre-post test group. Study was conducted in the Kedungkandang Primary Health Care, Malang City, East Java Province, Indonesia. In total 25 asthma patients recruited into a single group. The participant asked to practice the breathing exercise for three times a week and being evaluated after one month. The PEFR was measured by Peak Flow Meter. <i>Results:</i> The Wilcoxon test showed p grade < 0.05, which means there is a significant effect of the active cycle breathing technique on the PEFR grade. The increase of PEFR grade in asthma patients start to appear at the week third to the end of week fourth. Continuous treatment may increase the PEFR grade, however it was influenced by several factors such as age (years) and educational background. <i>Conclusion:</i> The active cycle breathing technique increase PEFR in asthma patients. The PEFR expected to be evaluated simultaneously, to assess the stages of improvement for asthma patient.

*Corresponding Author:

e-mail: julvaindaeka@gmail.com



This work is licensed under a Creative Commons Attribution 4.0 International License.

INTRODUCTION

Asthma is a temporary reversible airflow obstruction caused by a long-term inflammatory disease in the lower respiratory tract. Based on a report from Global Initiative for Asthma (GINA), the estimation number of asthma sufferers worldwide was reached by 300 million people, and the rate of mortality reported up to 180,000 cases for a year [1]. Management of asthma was focused to reduce the symptoms, reduce the disease exacerbation and decrease the number dosage of corticosteroid consumption. Moreover, the relapse of asthma symptoms can be controlled by a good management of asthma [1].

The characteristics of the airflow obstruction in asthma appear especially during expiration. When an asthma patient doing strongly exhalation, the expiratory flow will reach the highest point. The flow will reach the maximum point and not be able to increase eventhough the patient use a large power or energy. The PEFR in this study defined as the maximum expiration measurement. It was used to see the degree of airway obstruction as well as to work as asymptomatic detection for airway deterioration [2]. The grade of PEFR depend on the diameter of the airway. Especially in asthma patient, the narrowing condition of the airway may affect to the grade of PEFR.

The active cycle breathing technique is one of non-pharmacological treatment in the management of asthma. The indicator of maximum expiration point is showed by the PEFR grade. The breathing exercises then expected to be able increase the PEFR grade by focus-released the abnormal lung

secretions in order to increase the oxigent (O_2) supply and resulting a relaxation on bronchial muscle [3]. The aim of this study was to analyze the effectiveness of active cycle breathing technique exercise on the PEFR grade in asthma patient.

METHODS

The quasi experimental design was used, by using a single pre-post test group method. The study was conducted at Kedungkandang Primary Health Care, Malang City, East Java Province, Indonesia on February - March 2018. About 25 asthma patients recruited into a single group.

The participants were asked to practice the active cycle breathing technique exercise for three times a week. Final evaluation was did by the researcher at the last of the month. The PEFR grade then measured by Peak Flow Meter. The breathing exercises expected to be able increase the PEFR grade by focus-release the abnormal lung secretion in order to increase the oxigent (O_2) supply and resulting a relaxation on bronchial muscle [3]. The study intervention was approved by ethical clearance No. 637-KEPK Airlangga University.

RESULTS

Table 1 shows the majority of the respondent's age were range between 26-45 years old (N=17, 68%). Majority have junior high school educational background (N=12, 48%). Table 1 also shows the participant on bachelor degree (N=3, 12%) accomplished at least the tertiary level of their study. Mostly the participants were doing the domestic work as a housewife (N=15, 60%) and only

one respondent work as government employees (4%).

Table 2 shows the results of PEFr grades (result obtained from pre and post test) was $p = 0.041$. Which means there was significant influence of the active cycle breathing technique to the PEFr grades.

The highest PEFr grades shows at participant with the younger age and had profession as a housewife. The characteristics of young people, they were be able to recover quickly and has an airways elasticity better than the older people. The profession as a housewife also minimize the participant possibility to be exposed by the pollution or any work-related stress which may lead to the

asthma relapse. The work-related stress and pollution itself may reduce the grade of PEFr in asthma patients.

The uplift trends of PEFr grades in asthma patients was seen during the week third to fourth. Hence, it indicates the continuous practice of breathing exercise will resulting a significant increase of the PEFr grades. The active cycle breathing technique increased the PEFr grades significantly through the focus-released abnormal lung secretion process. Furthermore, the supply of oxigent (O_2) in the lung tissues will follow and resulting a relaxation of the smooth muscle inside the bronchial.

Table 1
The distribution of the study participant

Distribution	Frequency (N)	Percentage
Age (Years)		
18 - 25	2	8 %
26 - 45	17	68 %
46 - 60	6	24 %
Total	25	100 %
Educational backgroud		
Elementary school	5	20 %
Junior high school	12	48 %
Senior high school	5	20 %
Bachelor	3	12 %
Total	25	100%
Profession		
Government employees	1	4 %
Entrepreneur	4	16 %
Private employees	3	12 %
Farmer	2	8 %
Housewife	15	60 %
Total	25	100%

Table 2

The analysis of Peak Expiratory Flow Rate (PEFR) at the Kedungkandang Primary Health Care

Variable	Pre-test (Med ± SD)	Range	Post-test (Med ± SD)	Range	<i>p value</i>
PEFR	290 ± 71,3	190-460	300 ± 73,8	190-490	0,041

DISCUSSION

The active cycle breathing technique significantly increases the PEFR grade in asthma patient. The highest point that patient able to reached during maximum exhalation defined as the maximum grade of the PEFR. By doing the full and strong expiration, the airflow will reaches to a maximum point. In asthma patient, there will be an airflow resistancy, especially during expiration [5]. The decrease of an airway space will causing the reduction of the maximum expiratory flow. The maximum point of expiration cannot be achieved if there is any symptom of shortening of the breath, include asthma.

The effect size of this study intervention was calculated from several respondents who experience an uplift of PEFR score during post-test evaluation (Table 2). Evaluation on the PEFR score was measured every three times per week and the best score was taken. Almost all of the respondents showed non improvement score since the initial PEFR assessment until the second of the week. However, during the week third, some respondents were showed an PEFR score improvement. The simultaneous increase score was seen by the final week. This positive improvement on PEFR score means that the breathing exercises significantly affect the PEFR, even though the trend was not appear among majority of the respondents. The trends was found in the participants whose

age less than 30 years old. A constant score of PEFR was found among participant whose age more than 30 years old. The educational background of the respondents who experienced an increase in PEFR score were relatively diverse from junior high school to the senior high school. In terms of occupational characteristics, the majority of the respondents with positive improvement on PEFR score were a housewife.

The study analysis of Peak Expiratory Flow Rate (PEFR) in patient with respiratory disorders at the Coastal City of Banda Aceh Province, showed that asthma patients who had an older age were tend to have a lower decreasing risk on their PEFR score [7]. Physiologically, with the increase number of the age, the ability of body organs will naturally decrease, especially on the airways elasticity [2]. This was in line with the result of this study, an uplift trend of PEFR score were showed among participant whose age less than 30 years old compare with the constant result of post-test PEFR grade among participant whose aged greater than 30 years old. By the end of the study, the PEFR grade was also tended to increase in the participant whose younger, compare to the older age participant were showed a relative low grades of PEFR.

The respondent with a higher level of productivity will have the higher risk to exposed by the pollution and work-related

stressors. However in this study, majority of the participant were housewives, those who showed an uplift trends of the PEFR grades [8]. The self control on the asthma management were important among the other profession in order to lowering the risk of pollution exposure, overworked activity and work-related stress to their post-test PEFR score. Respondents who experience a relapse of asthma will showing a lower score in their post-test PEFR result [9].

The relapse of asthma commonly occurs when there are an airflow resistancy, especially during the expiration process. When a patient doing strong exhalation, the airflow will reach at the maximum point [10], resulting a lowering expiratory flow. The maximum expiratory flow will be able to achieve when there were no single symptoms of shortening of the breath and reduction of respiratory tract space [3]. It is also assumed that there was a possible correlation between PEFR grades and the patient-self management of the asthma. Nurses were expected to improve the patient-self management among asthma patients by practicing the active cycle breathing technique as preventive, promotive and rehabilitative efforts in order to achieve the optimal control in asthma patient.

CONCLUSION

The conclusion of this study there was a significant effect of the active cycle breathing technique to the PEFR grades in asthma patients, even though the increase was unevenly among all of the study participants. Continuous treatment may increase the PEFR grade, however it was influenced by several factors such as age (years), educational

background, working space environment and the patient-self management of asthma itself. Further research on simultaneous evaluation of the PEFR is needed by the end of the study, in order to assess the improvement of PEFR stages in asthma patient.

REFERENCES

- [1] GINA, "Pocket Guide for Asthma Management and Prevention: In Based Global Strategy for Asthma Management and Prevention,". Fontana, USA: Global Initiative for Asthma, 2017.
- [2] P. Barnes, Asthma and COPD - Basic Mechanism and Clinical Management, 2nd ed. New York: Elsevier, 2015.
- [3] C. Hall et al., "Nonpharmacologic Therapy for Severe Persistent Asthma," J. Allergy Clin. Immunol. Pract., vol. 5, no. 4, pp. 928-935, 2017, doi: 10.1016/j.jaip.2017.04.030.
- [4] J. Hall, Guyton dan Hall Buku Ajar Fisiologi Kedokteran, 12th ed. Singapore: Elsevier, 2014.
- [5] Mulyadi, Zulfitri, and S. Nafisah, "Analisis Hasil Peak Expiratory Flow Rate (PEFR) pada Pasien Gangguan Pernapasan di Pesisir Kota Banda Aceh," J. Respir. Indones., vol. 31, no. 2, pp. 101-104, 2011.
- [6] W. Atmoko et al., "Prevalens Asma Tidak Terkontrol dan Faktor-Faktor yang Berhubungan dengan Tingkat Kontrol Asma di Poliklinik Asma Rumah Sakit Persahabatan Jakarta," J. Respir. Indones., vol. 31, no. 2, pp. 53-60, 2011.
- [7] T. H. Merghani and A. O. Alawad, "Indicators of Asthma Control in Asthmatic Patients: Are they related to

- Depression?," Open Access Maced. J. Med. Sci., vol. 5, no. 5, pp. 673–676, 2017, doi: 10.3889/oamjms.2017.091.
- [8] S. R Anand and D. Anandhi, "Immediate effects of Active Cycle of Breathing Technique and Conventional Chest Physiotherapy in Subjects with Bronchiectasis - A Comparative Study," Indian Journal of Physiotherapy and Occupational Therapy, vol. 8, no. 1, pp. 105–113, 2014, doi: 10.5958/j.0973-5674.8.1.021.
- [9] W. A. Prasetya, "Pengaruh Latihan Nafas Buteyko terhadap PEFr dan Derajat Kontrol Asma di Puskesmas Pakis," Universitas Airlangga, 2011.
- [10] S. Dorevitch et al., "Efficacy of an outdoor air pollution education program in a community at risk for asthma morbidity," J. Asthma., vol. 45, no. 9, pp. 839-844, 2008, doi: 10.1080/02770900802339759.
- [11] R. K. Elnaggar and M. A. Shendy, "Efficacy of noninvasive respiratory techniques in the treatment of children with bronchial asthma: a randomized controlled trial," Bulletin of Faculty of Physical Therapy, vol. 21, pp. 1–10, 2016, doi: 10.4103/11110-6611.188025.
- [12] G. S. Skloot et al., "An Official American Thoracic Society Workshop Report: Evaluation and Management of Asthma in the Elderly," Ann. Am. Thorac. Soc., vol. 13, no. 11, pp. 2064–2077. Doi: 10.1513/AnnalsATS.201608-658ST.