Jurnal Kesehatan Manarang

Jurnal Kesehatan Manarang, Volume 10, Number 1, April 2024, pp. 59 – 65
ISSN 2528-5602 (Online), ISSN 2443-3861 (Print)
doi: https://doi.org/10.33490/jkm.v10i1.965

THE EFFECT OF DIAPHRAGMATIC BREATHING EXERCISES ON PEAK EXPIRATORY FLOW RATE IN BRONCHIAL ASTHMA PATIENTS

Widya Sepalanita✉, **Alif Faturachman**, **Toto Subiakto**
Nursing Department, Health Polytechnic, Ministry of Health, Banten

ARTICLE INFO

Article history

Submitted : 2023-07-16
Revised : 2024-03-29
Accepted : 2024-04-16

Keywords:

Diaphragmatic Breathing;
Exercise;
PEFR;
Asthma

ABSTRACT

Background: *Asthma is a prevalent, chronic, and varied condition in which most people experience dyspnea, wheezing, chest tightness, and coughing due to reversible airway obstruction, airway inflammation, and bronchial hyperreactivity. cause the quality of life to diminish. The breathing method known as diaphragmatic breathing is tailored to the needs of asthmatics. During a deep inhale, a breathing method called diaphragmatic breathing relaxes the respiratory muscles.* ***Objective:*** *To determine the effect of diaphragmatic breathing exercises on peak expiratory flow rate (PEFR) patients with bronchial asthma.* ***Method:*** *This type of research is quasi-experimental with a one-group pre-test and post-test design. The sampling method used purposive sampling with 15 respondents. The PEFR measurement instrument uses a peak flow meter. Data were analyzed univariately and bivariately using the paired T-Test. Results: The average PEFR value before and after diaphragmatic breathing exercise therapy was 246.67 L/minute and 300 L/minute. There was a significant difference in PEFR before and after being given diaphragmatic breathing exercise therapy with an increase in PEFR value of 53.33 L/minute (p-value 0.00).* ***Conclusion:*** *Diaphragmatic breathing exercises have a significant influence on PEFR values in bronchial asthma patients*

Kata Kunci:

Latihan Pernapasan Diafragma,
PEFR,
Asma

ABSTRAK

Latar belakang: Asma merupakan penyakit kronis dan heterogen umum yang ditandai dengan obstruksi jalan napas reversibel, inflamasi jalan napas, dan hipersensitif bronkus yang menyebabkan dispnea, mengi, sesak dada, batuk, dan gangguan *quality of life* bagi sebagian besar pasien. Pada pasien asma, latihan pernapasan yang sesuai dengan keadaan pasien tersebut adalah pernapasan diafragma. Latihan pernapasan diafragma adalah latihan pernapasan yang merelaksasikan otot-otot pernapasan saat melakukan inspirasi dalam. **Tujuan:** Untuk mengetahui pengaruh latihan pernapasan diafragma terhadap *peak expiratory flow rate* (PEFR) pada pasien asma bronkial. **Metode:** Jenis penelitian ini adalah quasi experimental dengan rancangan penelitian *one group pre-test and post-test design*. Metode pengambilan sampel menggunakan purposive sampling sebanyak 15 responden. Instrumen pengukuran PEFR menggunakan alat *peak flow meter*. Data dianalisis secara univariat dan bivariat menggunakan uji *paired T-Test.* **Hasil:** Didapatkan nilai rata-rata PEFR sebelum dan setelah dilakukan terapi latihan pernapasan diafragma adalah 246,67 L/menit dan 300 L/menit. Terdapat perbedaan PEFR yang signifikan sebelum dan setelah diberikan terapi latihan pernapasan diafragma dengan peningkatan nilai PEFR sebesar 53,33 L/menit (*p-value* 0,00). **Kesimpulan:** Latihan pernapasan diafragma memiliki pengaruh yang signifikan terhadap nilai PEFR pada pasien asma bronkial.

✉ ***Corresponding Author:***

Widya Sepalanita
Telp. +62 81366733036
Email: wsepalanita@gmail.com

INTRODUCTION

Asthma is a widespread chronic and heterogeneous disease characterized by reversible airway obstruction, airway inflammation, and bronchial hypersensitivity, resulting in dyspnea, wheezing, chest tightness, cough, and reduced quality of life (QoL) in the majority of patients (Papi et al., 2018). According to the Ministry of Health of the Republic of Indonesia states that Indonesia has a prevalence of asthma based on data from the Indonesian Basic Health Research (Riskesdas), the prevalence rate of asthma in Indonesia reaches 2.4%, and in women, the the highest prevalence of asthma reaches 2.5%. With a population of asthma sufferers in Indonesia of 1.02 million people. Judging from the overall

percentage of asthma sufferers, DI Yogyakarta (4.59%), East Kalimantan (4.0%), and Bali (3.9%) have the highest prevalence of asthma sufferers. The prevalence of DKI Jakarta (2.6%) with a total population of asthma sufferers is 40,210 people (Kemenkes RI, 2018).

The high prevalence rate of asthma sufferers in Indonesia has put the spotlight on various parties in finding solutions so that asthma can be minimized. Treatment other than that given by doctors is needed to help reduce asthma symptoms. Pharmacological therapy is therapy given by taking medication in the form of medications such as bronchodilators and corticosteroids, while non-pharmacological therapy is a therapeutic modality of physiotherapy in the form of breathing exercises. Breathing exercises for asthma patients are used to improve breathing and to train the patient's breathing ability if a relapse occurs (Kartikasari et al., 2019).

There are several types of non-pharmacological therapy for asthma, one of which is breathing exercises. Breathing exercise interventions have various techniques such as deep breathing exercises, pursed lip breathing, and diaphragmatic breathing exercises. The need for intervention is adjusted to the patient's condition. This exercise functions as an indicator of seeing breathing patterns properly and correctly and improving respiratory function. In asthma patients, breathing exercises that are appropriate to the patient's condition are diaphragmatic breathing (Reis et al., 2023; Santino et al., 2020).

Deep inspiration during diaphragmatic breathing exercises causes the respiratory muscles to relax (Rahmasari et al., 2022). This therapy focuses on the process of inspiration and expiration using the diaphragm breathing muscle. Diaphragmatic breathing exercises increase carbon-dioxide removal in the lungs, reducing the amount of effort required to breathe as ventilation increases. Greater perfusion results from greater ventilation, which increases intraalveolar pressure and facilitates efficient gas exchange. This causes the degree of acidity (pH) to decrease in arterial blood so that carbon-dioxide levels decrease and increase the Peak Expiratory Flow Rate (Kartikasari et al., 2019).

Peak Expiratory Flow Rate or Peak Expiratory Flow is the highest flow point with optimal expiration. The PEFR value describes the formation of a significant shift in the dimensions of the airway (Gold & Koth, 2016). Peak Expiratory Flow Rate (PEFR) is a term used to characterize the condition of the airways and the highest air flow achieved during expiration with the least amount of effort using the entire lung capacity. PEFR is used to evaluate the impact of various variables, such as pharmaceutical therapy, air pollution exposure, and airway diameter (Warsono & Fahmi, 2016). Adult males often have peak expiratory flows in the range of 400–600 L/minute, whereas adult females typically have flows in the range of 300–500 L/minute. In contrast, it ranges between 200 and 400 L/minute in children. The correlation between PEFR readings and FEV1 measurements is the same (Potter et al., 2017; Sitalakshmi et al., 2013).

Several studies have proven that diaphragmatic breathing exercises can overcome respiratory function problems in several situations with indicators of success, namely respiratory function (RR and APE) and respiratory control. This was proven in research by Pangestuti (2015) which concluded that there was an influence of diaphragmatic breathing exercises on respiratory function (RR and APE) in the elderly after the second week of intervention. According to this research, using the diaphragm muscles has a better effect than using the intercostal muscles (Pangestuti et al., 2015). There is an influence of diaphragmatic breathing exercises on breathing control. Breathing exercises are very helpful for patients in regaining their respiratory function, especially for asthma sufferers who previously suffered from a lack of carbon dioxide due to hyperventilation, which causes the body to adapt to reduce oxygen levels, which can cause a decrease in oxygen levels. decreased peripheral oxygen saturation (Utoyo & Nugroho, 2021).

Based on the results of interviews with asthma sufferers in the work area of the Kalideres District Health Center, 13 out of 15 asthma sufferers experienced quite frequent recurrences, followed by clinical manifestations that appeared, including shortness of breath, coughing, and wheezing, which could interfere with asthma sufferers in carrying out daily activities. All asthma sufferers stated that they did not know about diaphragmatic breathing exercise therapy and had never measured PEFR values using a peak flow meter.

Peak flow meter is a lung function test tool that is simple, compact, easy to carry, cheap and easy to use to check PEFR (Patil et al., 2020). Thus, routine and periodic checks on lung function should be carried out in asthma patients, so that this can be an effort to prevent recurrent asthma attacks and ventilation problems in the lungs. Based on this phenomenon, researchers wanted to investigate the

effect of diaphragmatic breathing exercises on PEFR in bronchial asthma patients in the Kalideres District Health Center working area.

METHOD

Types of research

This research is a type of quantitative analysis. The research design is quasi-experimental with a one-group pretest and posttest design.

Research Location and Time

This research was carried out in the work area of the Kalideres District Health Center in January – May 2023.

Population and Sample

The research population was people with bronchial asthma in the Kalideres Community Health Center working area. The sampling technique is non-probability sampling, namely purposive sampling. The samples used were patients suffering from bronchial asthma in the Kalideres District Health Center working area with an age group of more than 14 years and less than 60 years who met the inclusion and exclusion criteria. Sample inclusion criteria were aged >14 years and <60 years, sufferers of intermittent - moderate bronchial asthma with composmentis awareness. Meanwhile, the exclusion criteria were asthma sufferers who refused to be respondents and were experiencing a relapse. The research sample was 15 people. This sample size calculation uses the paired analytical sample size formula (Dahlan, 2014). The determination of the sample size calculation was based on information obtained by researchers from previous related research, namely that a standard deviation of 5.794 was obtained and the minimum difference in the mean which was considered significant was 5.96 (Pangestuti et al., 2015).

Data collection

Peak Expiratory Flow Rate (PEFR) data collection uses a standardized and calibrated Rossmax Therapy PF120 ISO13485 peak flow meter. The data collection stage begins with pre-test PEFR measurements. Next, intervention was carried out on respondents for seven days with a training frequency of three sessions a day. The technique used in 1 cycle of diaphragmatic breathing is technique 2, 4, 2, namely 2 seconds of inhalation, followed by 4 seconds of holding the breath by allowing the abdominal muscles to protrude as much as possible, and 2 seconds of exhalation or exhalation. This exercise is repeated until one training session is completed in 1 minute and is followed by 2 minutes of rest. Then the next training session can be carried out. Diaphragmatic breathing exercises are carried out in a supine or sitting position if possible, where one hand is placed on the abdomen (just below the ribs) and one hand on the chest. On the 8th day, PEFR measurements were carried out to obtain post-test data. The independent variable in this study was diaphragmatic breathing exercises. The dependent variable in this study is PEFR in asthma patients.

Processing and analysis of data

The research data was analyzed univariately which was displayed in the form of frequency (f) and percentage (%), mean value, standard deviation, 95% CI, and min–max values for PEFR data. Next, the data was subjected to bivariate analysis. The researcher began the analysis by testing the normality of the PEFR data before and after the intervention. After obtaining the results of the PEFR data analysis with a normal distribution, then the bivariate statistical test used can be determined, namely the paired T-test with a significance level of 95% (α=0.05) to determine the difference in mean PEFR between the pre-test and post-test. This test compares the PEFR of bronchial asthma patients before and after diaphragmatic breathing exercises.

RESULTS

Based on table 1 shows that the characteristics of the respondents are mostly distributed in the 30 - 39 year and 40 - 49 year groups with 6 respondents (40%) each, and 11 respondents (73.3%) are female.

Table 1. Frequency Distribution of Respondent Characteristics (n=15)

Characteristics	Frequency (n)	Percentage (%)
Age		
20-29 years	3	20.0
30-39 years	6	40.0
40-49 years	6	40.0
50-59 years	0	0
Gender		
Male	4	26.7
Female	11	73.3
Total	**15**	**100.0**

Table 2 shows that the normality test results of the PEFR measurement data before and after being given diaphragmatic breathing exercise therapy were obtained with a significance value of >0.05. Statistically, it shows that the PEFR measurement data is normally distributed.

Table 2. Results of Respondents' Peak Expiratory Flow Rate Normality Test (n=15)

Variable	N	Mean (SD)	*Sig. (2-tailed)*
PEFT Pretest	15	0.907	0.121
PEFT Posttest	15	0.936	0.337

Table 3. Mean Peak Expiratory Flow Rate of Respondents Before and After Diaphragmatic Breathing Exercise Therapy (n=15)

Variable	Mean	SD	Min-Max	95% CI
Pretest	246,67	35,590	200-310	18,01
Posttest	300,00	33,806	250-360	17,10

Table 4. Effect of Diaphragmatic Breathing Exercises on Peak Expiratory Flow Rate in Bronchial Asthma Patients (n=15)

Variable	N	Mean (SD)	*Sig. (2-tailed)*
Pretest	15	246,67 (35,590)	0.000
Posttest	15	300,00 (33,806)	

Table 4 shows that the 15 respondents did diaphragmatic breathing exercises with an average pre-test peak expiratory flow rate value of 246.67 L/minute and an average post-test result of diaphragmatic breathing exercises, namely 300 L/minute. Based on the paired T-test, it produces a significance value of 0.000 <0.05, which shows that diaphragmatic breathing exercises significantly influence the peak expiratory flow rate of bronchial asthma patients.

DISCUSSION

Based on the research results, the average peak expiratory flow rate before diaphragmatic breathing exercise was 246.67 L/minute and the average value after diaphragmatic breathing exercise was 300 L/minute. There was an increase in the mean PEFR value after intervention as much as 53.33 L/minute. This proves that diaphragmatic breathing exercises can improve the achievement of maximum airflow and channel conditions in patients with bronchial asthma, thereby influencing the achievement of optimal ventilation. Thus, diaphragmatic breathing exercises in asthma patients will certainly be able to prevent ventilation problems resulting from the narrowing of the airways.

The results of this study by Andapi (2022) that there was an increase in the mean peak expiratory flow rate (PEFR) before receiving diaphragmatic breathing exercises (345.76 L/minute) compared to

after doing diaphragmatic breathing exercises (358.81 L/minute). There is a significant influence between diaphragmatic breathing exercises on PEFR in bronchial asthma patients (Alaparthi et al., 2016; Andapi & Fredrika, 2022).

Diaphragmatic breathing exercises are breathing exercises carried out to relax the respiratory muscles during the process of deep inspiration (Rahmasari et al., 2022). This is the basis that diaphragmatic breathing exercise therapy causes carbon dioxide to come out of the lungs which affects increased ventilation due to increased perfusion which can cause an increase in intra-alveolar pressure so that effective gas exchange occurs and reduces the work of breathing (Wardani et al., 2019).

Peak Expiratory Flow Rate (PEFR) is a term used to characterize the condition of the airways and the maximum airflow achieved during forced expiration using optimal lung capacity. PEFR or peak expiratory flow is the highest flow point that can be achieved by maximal expiration. The PEFR value reflects a change in airway size to become larger (Potter et al., 2017). The use of PEFR to evaluate the airway in several aspects such as pharmacological therapy, exposure to air pollution, and airway caliber (Lupu et al., 2023).

Diaphragmatic breathing exercises for a week in a row can influence an increase in PEFR. Breathing with the diaphragm muscle can increase the level of expiratory force and increase PEFR after exercise. It also helps air escape during expiration and offers a stronger force to empty the lungs (Kartikasari et al., 2019). Asthma sufferers will experience increased airway resistance, especially during expiration, this leads to the concept of maximum expiratory flow, namely the expiratory airflow increases to its maximum flow when a person exhales forcefully. As soon as the lungs are sufficiently full of air, the maximum expiratory flow increases. Maximum expiratory flow decreases as lung capacity decreases (Kustiono & M, 2020). There are differences in PEFR before and after diaphragmatic breathing exercise therapy. Diaphragmatic breathing exercises maximize the release of air during expiration by reducing intrathoracic volume using abdominal muscles (Hamasaki, 2020).

In this study, respondents were given diaphragmatic breathing exercise intervention. The diaphragm is the main respiratory muscle, but patients often use accessory respiratory muscles when shortness of breath attacks. Conscious use of the diaphragm muscle during breathing can relax and save energy (Russo et al., 2017). The goal of diaphragmatic breathing exercises is to increase ventilation, perfusion, and intraalveolar pressure so that the diaphragm contracts to expel carbon dioxide, which reduces the work of breathing, increases gas exchange, and increases peak expiratory flow (Yong et al., 2017).

According to researchers, diaphragmatic breathing exercises help asthma sufferers train their breathing during inspiration and expiration. Breathing using the diaphragm muscle which is the main respiratory muscle can slow down the rate of breathing thereby minimizing the need for oxygen and the energy needed to breathe and proper diaphragm breathing exercises can maximize the use of the diaphragm muscle (Santino et al., 2020). With exercise, upper chest breathing can be changed to diaphragmatic breathing which can reduce respiratory rate, increase alveolar ventilation, and help expel as much air as possible during respiration (Vieira et al., 2014).

CONCLUSIONS AND RECOMMENDATIONS

The characteristics of the research respondents were that the majority were in the age group 30-49 years and 40-49 years and the majority of respondents were female. There was a significant effect of increasing the peak expiratory flow rate value after bronchial asthma patients were given diaphragmatic breathing exercise intervention. For this reason, it is hoped that diaphragmatic breathing exercises can be used as part of standard interventions in providing nursing care to patients with bronchial asthma to improve the achievement of airway conditions and maximum airflow.

REFERENCES

Alaparthi, G. K., Augustine, A. J., Anand, R., & Mahale, A. (2016). Comparison of Diaphragmatic Breathing Exercise, Volume and Flow Incentive Spirometry, on Diaphragm Excursion and Pulmonary Function in Patients Undergoing Laparoscopic Surgery: A Randomized Controlled Trial. *Minimally Invasive Surgery*, *2016*, 1–12. https://doi.org/10.1155/2016/1967532

Andapi, R., & Fredrika, L. (2022). Efektivitas Latihan Pernafasan Diafragma Dan Yoga Pranayama Terhadap Peningkatan Arus Puncak Eskpirasi Pada Pasien Asma Di Puskesmas Lingkar Timur

Kota Bengkulu. *Jurnal Ners Generation*, *1*(2). https://jurnal.umb.ac.id/index.php/ng/article/view/3845

Gold, W. M., & Koth, L. L. (2016). Pulmonary Function Testing. In *Murray and Nadel's Textbook of Respiratory Medicine* (pp. 407-435.e18). Elsevier. https://doi.org/10.1016/B978-1-4557-3383-5.00025-7

Hamasaki, H. (2020). Effects of Diaphragmatic Breathing on Health: A Narrative Review. *Medicines*, *7*(10), 65. https://doi.org/10.3390/medicines7100065

Kartikasari, D., Jenie, I. M., & Primanda, Y. (2019). Latihan Pernapasan Diafragma Meningkatkan Arus Puncak Ekspirasi (APE) dan Menurunkan Frekuensi Kekambuhan Pasien Asma. *Jurnal Keperawatan Indonesia*, *22*(1), 53–64. https://doi.org/10.7454/jki.v22i1.691

Kemenkes RI. (2018). *Hasil Riset Kesehatan Dasar 2018*. Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia. https://cegahstunting.id/download/864/

Kustiono, A. D., & M, S. B. (2020). Pengaruh Senam Asma Terhadap Frekuensi Kekambuhan Dan Kapasitas Vital Paru Pada Penderita Asma di Balai Kesehatan Paru Masyarakat Semarang. *Journal of Sport Sciences and Fitness*, *5*(2), 104. https://journal.unnes.ac.id/sju/jssf/article/view/40065

Lupu, V. V., Jechel, E., Fotea, S., Morariu, I. D., Starcea, I. M., Azoicai, A., Mocanu, A., Mitrofan, E. C., Lupu, A., Munteanu, D., Badescu, M. C., Cuciureanu, M., & Ioniuc, I. (2023). Current Approaches in the Multimodal Management of Asthma in Adolescents—From Pharmacology to Personalized Therapy. *Biomedicines*, *11*(9), 2429. https://doi.org/10.3390/biomedicines11092429

Pangestuti, S. D., Murtaqib, M., & Widayati, N. (2015). Pengaruh Diaphragmatic Breathing Exercise terhadap Fungsi Pernapasan (RR dan APE) pada Lansia di UPT PSLU Kabupaten Jember (The Effect of Diaphragmatic Breathing Exercise on Respiration Function (RR and PEFR) in Elderly at UPT PSLU Jember Regency. *E-Journal Pustaka Kesehatan (JPK)*, *3*(1). https://jurnal.unej.ac.id/index.php/JPK/article/view/2428

Papi, A., Brightling, C., Pedersen, S. E., & Reddel, H. K. (2018). Asthma. *The Lancet*, *391*(10122), 783–800. https://doi.org/10.1016/S0140-6736(17)33311-1

Patil, R., N, S., & Veena, V. (2020). Peak flow meter and digital spirometer: A comparative study of peak expiratory flow rate values. *National Journal of Physiology, Pharmacy and Pharmacology*, 1. https://doi.org/10.5455/njppp.2020.10.02047202004052020

Potter, P. A., Perry, A. G., Stockert, P., & Hall, A. (2017). *Fundamentals of Nursing* (New York). https://books.google.co.id/books/about/Fundamentals_of_Nursing_E_Book.html?hl=id&id=eCKKCwAAQBAJ&redir_esc=y

Rahmasari, Y. D., Rosmalawati, N. W. D., & Mustayah, M. (2022). Pengaruh Diaphragmatic Breathing Exercise terhadap Perubahan Respiratory Rate pada Pasien Asma di Ruang Interna II RSUD Dr. R Soedarsono Kota Pasuruan. *Journal of Applied Nursing (Jurnal Keperawatan Terapan)*, *7*(2), 126. https://doi.org/10.31290/jkt.v7i2.1012

Reis, N., Gaspar, L., Paiva, A., Sousa, P., & Machado, N. (2023). Effectiveness of Nonpharmacological Interventions in the Field of Ventilation: An Umbrella Review. *International Journal of Environmental Research and Public Health*, *20*(7), 5239. https://doi.org/10.3390/ijerph20075239

Russo, M. A., Santarelli, D. M., & O'Rourke, D. (2017). The physiological effects of slow breathing in the healthy human. *Breathe*, *13*(4), 298–309. https://doi.org/10.1183/20734735.009817

Santino, T. A., Chaves, G. S., Freitas, D. A., Fregonezi, G. A., & Mendonça, K. M. (2020). Breathing exercises for adults with asthma. *Cochrane Database of Systematic Reviews*, *2020*(3). https://doi.org/10.1002/14651858.CD001277.pub4

Sitalakshmi, R., Poornima, N. K., & Karthick, N. (2013). The Peak Expiratory Flow Rate (PEFR): the Effect of Stress in a Geriatric Population of Chennai- A Pilot Study. *Journal of Clinical and Diagnostic Research*, *14*. https://doi.org/10.7860/JCDR/2013/5356.2728

Utoyo, B., & Nugroho, I. A. (2021). Pengaruh terapi Diaphragmatic Breathing Exercise terhadap Pengontrolan Pernapasan Pasien Asma di Kecamatan Sruweng. *Jurnal Ilmiah Kesehatan Keperawatan*, *17*(1), 86. https://doi.org/10.26753/jikk.v17i1.516

Vieira, D. S. R., Mendes, L. P. S., Elmiro, N. S., Velloso, M., Britto, R. R., & Parreira, V. F. (2014). Breathing exercises: influence on breathing patterns and thoracoabdominal motion in healthy subjects. *Brazilian Journal of Physical Therapy*, *18*(6), 544–552. https://doi.org/10.1590/bjpt-rbf.2014.0048

Wardani, E. D. K., Faidah, N., & Nugroho, T. W. (2019). Efektivitas Diaphragmatic Breathing Exercise Terhadap Peningkatan Saturasi Oksigen Pasien PPOK Di Ruang Melati I dan Melati II Rsud Dr.Loekmonohadi Kudus. *Prosiding HEFA 4*. https://prosiding.stikescendekiautamakudus.ac.id/index.php/pros/article/view/357

Warsono, W., & Fahmi, F. Y. (2016). Peran Latihan Pernafasan terhadap Nilai Kapasitas Vital Paru pada Pasien Asma (Literatur Review). *Care : Jurnal Ilmiah Ilmu Kesehatan*, *4*(3). https://doi.org/10.33366/jc.v4i3.443

Yong, M.-S., Lee, H.-Y., & Lee, Y.-S. (2017). Effects of diaphragm breathing exercise and feedback breathing exercise on pulmonary function in healthy adults. *Journal of Physical Therapy Science*, *29*(1), 85–87. https://doi.org/10.1589/jpts.29.85