

Efficacy of Pursed-Lips Breathing

A BREATHING PATTERN RETRAINING STRATEGY FOR DYSPNEA REDUCTION

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- **PURPOSE:** Breathing pattern retraining is frequently used for exertional dyspnea relief in adults with moderate to severe chronic obstructive pulmonary disease. However, there is contradictory evidence to support its use. The study objective was to compare 2 programs of prolonging expiratory time (pursed-lips breathing and expiratory muscle training) on dyspnea and functional performance.
- **METHODS:** A randomized, controlled design was used for the pilot study. Subjects recruited from the outpatient pulmonary clinic of a university-affiliated Veteran Affairs healthcare center were randomized to: 1) pursed-lips breathing, 2) expiratory muscle training, or 3) control. Changes over time in dyspnea [modified Borg after 6-minute walk distance (6MWD) and Shortness of Breath Questionnaire] and functional performance (Human Activity Profile and physical function scale of Short Form 36-item Health Survey) were assessed with a multilevel modeling procedure. Weekly laboratory visits for training were accompanied by structured verbal, written, and audiovisual instruction.
- **RESULTS:** Forty subjects with chronic obstructive pulmonary disease [age = 65 ± 9 (mean \pm standard deviation) years, forced expiratory volume 1 second/forced vital capacity % = 46 ± 10 , forced expiratory volume 1 second % predicted = 39 ± 13 , body mass index = 26 ± 6 kg/m², inspiratory muscle strength = 69 ± 22 cm H₂O, and expiratory muscle strength (PE_{max}) = 102 ± 29 cm H₂O] were enrolled. No significant Group \times Time difference was present for PE_{max} ($P = .93$). Significant reductions for the modified Borg scale after 6MWD ($P = .05$) and physical function ($P = .02$) from baseline to 12 weeks were only present for pursed-lips breathing.
- **CONCLUSION:** Pursed-lips breathing provided sustained improvement in exertional dyspnea and physical function.

K E Y W O R D S

breathing exercises

chronic obstructive

dyspnea

pulmonary disease

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Chronic dyspnea, the constant and unpleasant sensation of shortness of breath, negatively impacts health-related quality of life for those with a progressive lung disease such as chronic obstructive pulmonary disease (COPD).¹ Functional status is reduced² and social isolation is likely.

Dyspnea is traditionally managed with pharmacologic modalities to reduce airway inflammation and bronchospasm as well as self-care management strategies such as breathing pattern retraining. One commonly used breathing pattern retraining strategy is pursed-lips breathing (PLB), defined as “a variable

expiratory resistance that is created by constricting the lips.”³ Pursed-lips breathing is purported to change the breathing pattern so that dyspnea is reduced. Although COPD patients report the effectiveness of PLB,⁴ data-based studies provide inconsistent findings.⁵⁻⁷ Consequently, evidence-based practice guidelines^{8,9} for dyspnea management do not recommend its use. The experts acknowledge that breathing pattern retraining may provide dyspnea relief, but do not specifically endorse its application.

People with COPD have insufficient time for expiration due to increased airway resistance and

pressure-dependent airway collapse. During exercise, expiratory flow limitation worsens and leads to incomplete expiration, air trapping, and dynamic hyperinflation. This is manifested by an increase in end-expiratory lung volume at increased levels of ventilation,¹⁰ as opposed to a decrease in end-expiratory lung volume in healthy unobstructed people.³ It then becomes necessary for increased breath frequency to compensate for the associated decreased tidal volume. Each succeeding inspiration is initiated at a higher lung volume which requires increased elastic effort and may be perceived as increasing dyspnea. Dyspnea may be reduced by prolonging expiratory time to reduce dynamic airway compression and air trapping.^{11,12}

Breathing pattern retraining that focuses on gentle, prolonged exhalation addresses the main physiologic impediment in these patients.^{13,14} Pursed-lips breathing and expiratory muscle training (EMT) with a hand-held device that provides resistance on exhalation are 2 strategies that directly prolong exhalation.³

The objective of the present study was to compare the effectiveness of a breathing pattern retraining program of prolonged exhalation using PLB or EMT as compared with a control group in community-dwelling adults with moderate to severe COPD. After completion of the initial training, follow-up evaluation was done 12 weeks postbaseline. Reduction in exertional dyspnea was the primary outcome measure. Changes in functional performance were secondary outcomes.

METHODS

The institutional review board for human studies at Veterans Affairs Greater Los Angeles Healthcare System approved the protocol and written consent was obtained from all subjects. Data for this analysis are from a larger randomized controlled study on health-related quality of life in 53 subjects with COPD with measurements at baseline, 4 weeks, and 12 weeks.

Subjects

Subject inclusion criteria for the PLB, EMT, and control groups were a clinical diagnosis of COPD, expiratory airflow limitation evidenced by forced expiratory volume 1 second/forced vital capacity percent ($FEV_1/FVC\%$) less than 70 and $FEV_1\%$ predicted less than 80 with no reversibility by inhaled bronchodilator, and self-report of shortness of breath when walking. Exclusion criteria were exacerbation of symptoms (dyspnea, increased sputum volume, and/or increased sputum purulence) within the past 4 weeks, hospital admission within the past 4 weeks, change in bronchodilator therapy within the past 2 weeks, inability to walk, unstable angina, unstable cardiac dysrhythmia,

unstable congestive heart failure, unstable neurosis or psychiatric disturbance, or participation in a structured pulmonary rehabilitation program within the past year.

Procedures

Subjects completed 1 screening visit and 1 baseline testing visit. On the screening day, subjects were monitored during a 6-minute walk distance (6MWD), and those who reported a modified Borg score¹⁵ of 3 (“moderate”) or greater at the end of the 6MWD were randomly assigned to PLB, EMT, or a control group.

At baseline, subjects repeated the 6MWD, sat quietly in a lounge chair while their breathing frequency and duty cycle were monitored via respiratory inductive plethysmography (Respirace 200, Nims [Non-Invasive Monitoring Systems, Inc.], North Bay Village, Fla) for 25 minutes, completed clinical demographic and study questionnaires, and received breathing pattern retraining based on their randomly assigned group. Respiratory muscle strength was measured at residual volume.¹⁶

Subjects in the PLB and EMT groups were instructed to begin daily practice sessions and were given logs to record their practice times and potential adverse events. Four weekly visits to the research laboratory were made to reinforce their breathing pattern retraining program and to assure adherence to the assigned protocol. At each visit, the intervention subject inspiratory time-to-expiratory time ratio was used to pattern the walking stride. For example, a 1:2 ratio was interpreted to be 1 step on inhalation and 2 steps on exhalation. Each subject learned to adjust the stride and/or pace to match the individual inspiratory-to-expiratory time ratio. The purpose of the paced cadence was to assist transfer of the learned breathing pattern retraining to walking.

Coaching and practice during the weekly monitored practice sessions were reinforced with patient education handouts and audiovisual aids. At the end of week 4 and week 12, subjects completed the same schedule of testing as described for the baseline visit. All subjects made the same number of visits.

The control subjects received the American Lung Association health education pamphlet “About Lungs and Lung Disease.” They were monitored as frequently as the intervention subjects and received the same amount of attention during their visits to the research laboratory.

Breathing Pattern Retraining

The focus of the 2 breathing pattern retraining strategies was voluntary prolongation of expiratory time while allowing subject self-selection of a comfortable breathing pattern.¹⁷ Prolonged expiratory time was reinforced during the weekly monitored breathing

sessions by observation of their breathing pattern on a monitor. There was no specific targeted breathing frequency, tidal volume, or inspiratory flow rate. To assure adherence with the prescribed protocol, the daily diary for skills practice was reviewed weekly to determine the duration of practice times and to identify any difficulties with their assigned program.

Pursed-Lips Breathing

Pursed-lips breathing was taught by demonstration. The arterial oxygen saturation readings from a pulse oximeter (Nellcor, N-395, Puritan Bennett, Pleasanton, Calif) were used to provide feedback because reduced breathing frequency leads to increased tidal volume and, ultimately, may increase saturation.⁶ A light weight oximeter (Nonin 9500, Plymouth, MN) was provided for home use for the study's duration. Subjects were asked to breathe out through pursed lips (see Appendix A for specific instructions). Subjects were instructed to practice PLB for 10 min/d the first week, 15 min/d the second week, 20 min/d by the third week, and 25 min/d by the fourth week.

Expiratory Muscle Training

The second breathing retraining program used increased expiratory resistance with a Threshold™PEP (HealthScan, New Jersey). The flow-independent one-way valve provides a resistive load in the range of 4 to 20 cm H₂O when the subject exhales, and thereby directly prolongs exhalation with a reliably constant expiratory resistance. The expiratory load was set at 10% of a subject's baseline PE_{max}, with the objective of prolongation of expiration and not expiratory muscle strengthening as increased PE_{max} is not associated with decreased dyspnea.¹⁸ The expiratory resistance practice sessions were 10 min/d the first week, 15 min/d the second week, 20 min/d the third week, and 25 min/d the fourth week.

Measurement Instruments

Measurement of exertional dyspnea, the primary outcome, and functional performance were at baseline, week 4, and week 12.

Dyspnea

Dyspnea assessment was performed with the University of California, San Diego Shortness of Breath Questionnaire (SOBQ)¹⁹ and the modified Borg scale.²⁰ The University of California, San Diego SOBQ is a 24-item tool for measuring self-reported shortness of breath severity during the past week while performing 21 daily living activities on a 6-point scale. Scores range from 0 to 120, with the lower number associated with less shortness of breath. Psychometric properties were established in 28 subjects with COPD. The reported

internal consistency ($\alpha = .96$) is high. The questionnaire took approximately 5 to 7 minutes to complete and was administered before the modified Borg scale.

The modified Borg scale uses magnitude estimation to estimate the intensity of dyspnea and allows comparisons between subjects. The scale has a range between 0 and 10. A power function is incorporated by spreading the verbal descriptors out at the high end of the scale and placing them closer together at the low end of the scale. Thus "very, very strong" is 9, very, very weak is 0.5, and "moderate" is 3. The subject was instructed to point at the word that best described the shortness of breath. Reproducibility of the modified Borg scale has been well documented.^{21,22} The 6MWD was used as a stimulus for dyspnea with the Borg scale administered at both the beginning and end of the 6MWD.

Functional Performance

The 2 measures of functional performance were the Human Activity Profile and the physical function dimension of the Short Form 36-item Health Survey, Version 2.0.

The Human Activity Profile, originally used to measure quality of life in COPD patients in pulmonary rehabilitation programs,²³ was used as a measure of activity level. The 94 activity levels are grouped according to self-care activities, personal/household work activities, entertainment/social activities, and independent exercise activities. The subject responds with "still doing this activity," "have stopped doing this activity," or "never did this activity." The highest oxygen-demanding activity the person is still doing is the patient's primary score, reported as the maximal activity score. Lower scores are associated with lower oxygen-demanding activity. The maximal activity scores minus the total number of "have stopped doing this activity" responses below maximal Activity scores are recorded as adjusted activity scores. The adjusted activity scores reflect functional performance. Test-retest reliability in 29 adults in a smoking cessation program was 0.84. Content validity of Human Activity Profile is based on strong correlation between the activity and oxygen consumption values ($r = 0.83$, $P < .05$). Its usefulness for patients with COPD has been confirmed.²⁴ The questionnaire takes approximately 7 minutes to complete.

The SF-36²⁵ is a generic health-related quality-of-life tool with 2 summary measures of physical health and mental health. The physical health score includes the physical function scale, which is assessed with 10 items. The items are vigorous activities, moderate activities, lift and/or carry groceries, climb several flights, climb 1 flight, bend and/or kneel, walk 1 mile, walk several blocks, walk 1 block, bathe and/or dress. The psychometrics of the 36-item tool are well

established.²⁶ Reliability has been estimated with both internal consistency and test-retest methods for the 8 domains and 2 summary scores. The reliability for the physical function domain was 0.93.²⁷ A higher score is associated with improved physical functioning. Completion takes 5 minutes.

Statistical Analysis

Based on a power of 0.80, alpha of .05, and a standard deviation of 1, a sample size of 11 per group was needed to detect a clinically relevant decrease of 1 unit for the modified Borg scale.²⁸ A 20% attrition due to COPD exacerbations was anticipated.

To assess the effectiveness of randomization, the baseline characteristics across groups were compared with analysis of variance. The primary analyses involved repeated measures data, which required the use of multilevel modeling.^{29–31} Multilevel modeling allows appropriate adjustment for correlated errors due to repeated measures and maximizes analysis sample size by including all data points available for baseline, week 4, and week 12, even if subjects' repeated measures are not complete. All statistical tests used a Type 1 error rate of 5%. Data were analyzed with Statistical Package for the Social Sciences (SPSS), version 14.0 (Chicago, Ill) and SAS, version 9.1 (Raleigh, NC).

RESULTS

Forty subjects were randomly assigned, with 14 subjects in PLB and 13 subjects in EMT and control groups, respectively. One of the 40 subjects was not a veteran. Two subjects dropped out by the end of 4 weekly visits (1 from EMT and 1 from PLB) and 12 additional subjects (5 from EMT, 3 from PLB, and 4 from control) by week 12 due to exacerbations and/or lost to follow-up for a total completing week 12 of 10, 7, and 9 subjects, respectively, for PLB, EMT, and control.

Baseline demographic and clinical characteristics of the participants are shown in Table 1. There were no significant differences among groups. Loss of subjects did not impair group equivalency at either week 4 or week 12. Most subjects were white men, with an average age of 65 years, with an FEV₁% predicted = 39. They were former smokers, diagnosed with hypertension and coronary heart disease, graduated from high school, and reported an annual income between \$10,000 and \$19,999.

Dyspnea

Significant Group × Time improvement for the modified Borg scale after the 6MWD was found only for the PLB group when compared with the EMT and control groups ($P = .05$) at week 12 but not at week 4

Table 1 • BASELINE DEMOGRAPHIC AND CLINICAL CHARACTERISTICS FOR 3 COPD GROUPS

Group	PLB	EMT	Control
Subjects, n	14	13	13
Sex, male/female	13/1	13/0	12/1
Race			
White	9	7	7
Black	5	6	5
Hispanic	0	0	1
Age, y	62 ± 12	63 ± 5	69 ± 8
Body mass index	25 ± 7	28 ± 6	25 ± 4
PI _{max} , cm H ₂ O	67 ± 22	78 ± 25	64 ± 18
PE _{max} , cm H ₂ O	103 ± 23	104 ± 31	99 ± 35
FEV ₁ , % predicted	35 ± 8	43 ± 16	40 ± 15
FEV ₁ /FVC, %	46 ± 10	48 ± 10	47 ± 11
Pao ₂ , mm Hg	66 ± 13	77 ± 20	65 ± 14
Comorbid illness, n			
Arthritis	2	1	1
Hypertension	7	8	9
Circulatory problems	3	2	4
Coronary heart disease	4	2	6
Diabetes	1	3	2
Cancer	2	4	4
Alcohol/drug abuse history	3	3	3
Comorbid illness, n			
0	1	0	0
1	3	4	3
2	5	5	3
3 or more	3	4	6
Education, n			
<12 years	0	2	1
12 years	9	3	3
>12 years	5	8	9
Income, n*			
<\$10,000	5	3	5
\$10,000–\$19,999/year	6	5	2
\$20,000–\$39,999/year	0	2	4
≥\$40,000/year	0	1	0

COPD indicates chronic obstructive pulmonary disease; PLB, pursed-lips breathing; EMT, expiratory muscle training; n, number; PI_{max}, inspiratory muscle strength; PE_{max}, expiratory muscle strength; FEV₁, forced expiratory volume for 1 second; FVC, forced vital capacity; Pao₂, partial pressure, arterial oxygen.

Values are mean ± standard deviation.

*Not reported: Group 1 = 3, Group 2 = 2, Group 3 = 2.

(Figure 1). There was a consistent reduction in the SOBQ only for PLB, but the change did not achieve statistical significance. Mean ± standard deviation pulse oximetry saturation values for PLB between start and end of the 6MWD were lower at all time intervals with

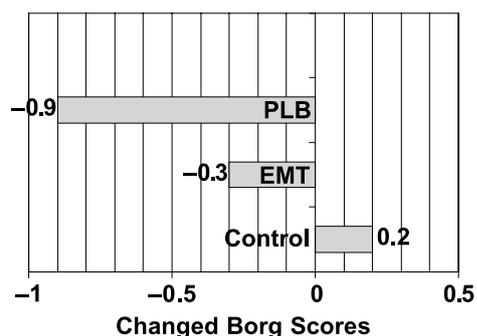


Figure 1. Reduction of dyspnea from baseline to week 12 after 6-minute walk distance for 3 COPD groups. COPD indicates chronic obstructive pulmonary disease; PLB, pursed-lips breathing; EMT, expiratory muscle training.

significant differences at week 4 ($P = .003$) and week 12 ($P = .028$) (see Table 2 for dyspnea results).

Functional Performance

Measures of functional performance using the Human Activity Profile and the physical function scale score of the SF-36 health-related quality-of-life measure are presented in Table 3. The Group \times Time interaction was significant only for the SF-36 physical function score ($P = .02$), with PLB subjects showing the greatest improvement. The PLB subjects compared with all subjects maintained consistently higher scores. There were no significant Group \times Time interaction for the 6MWD ($P = .35$).

Breathing Pattern and Respiratory Muscle Strength

There were no significant Group \times Time breathing pattern changes for breathing frequency ($P = .93$), inspiratory time ($P = .95$), expiratory time ($P = .81$), or inspiratory time/expiratory time ratio ($P = .12$) at week 12. Similar findings were present for expiratory muscle

strength ($P = .93$). A significant Group \times Time interaction was present for PI_{max} ($P = .01$). The PLB group improved from a baseline PI_{max} mean \pm standard deviation of 67 ± 24.2 cm H₂O to 84 ± 30 cm H₂O at week 12 without sustained improvement in the other groups (see Figures 2a and b).

DISCUSSION

In this study, results showed that the PLB group had significant improvement at 12 weeks for exertional dyspnea and functional performance, measured by the physical function scale of the SF-36. The sustained dyspnea improvement post-6MWD, coupled with significantly improved physical function, are particularly noteworthy findings because dyspnea is the most frequently reported and the most distressing symptom for patients with COPD.

Several explanations for the PLB benefit compared with EMT and control are likely. The simplest is the ready availability of PLB. No device is required to practice prolonged expiration as with EMT. Pursed-lips breathing can be used every waking hour and with every activity, including walking. Pursed-lips breathing can be incorporated into a patient's daily routine, and therefore, is less likely to be subject to extinction. Any dyspnea relief would reinforce its continued use.

The structured protocol of verbal, written, and audiovisual instructions, coupled with pulse oximetry biofeedback during the monitored training sessions and at home, may also explain reduced dyspnea for PLB. The protocol may have focused patients on their breathing so that voluntary cortical motor control overrode the sensation of breathlessness.

Reduced dynamic hyperinflation for the PLB subjects during the 6MWD is a likely physiologic mechanism. Dynamic hyperinflation, known to occur during the 6MWD in COPD,³² can be reduced with prolonged

Table 2 • DYSPNEA AT BASELINE, WEEK 4, AND WEEK 12 FOR 3 COPD GROUPS

Group Variable	Time	PLB	EMT	Control	F	P
Modified Borg					2.54	.05*
After 6MWD	Baseline	3.9 \pm 1.3	4.2 \pm 0.9	3.8 \pm 0.7		
	Week 4	3.2 \pm 0.9	3.7 \pm 0.7	3.2 \pm 0.8		
	Week 12	3.0 \pm 1.0	3.9 \pm 0.7	4.0 \pm 1.4		
SOBQ					1.69	.16
"Average day during past week"	Baseline	68 \pm 24	65 \pm 19	58 \pm 28		
	Week 4	60 \pm 16	63 \pm 18	64 \pm 20		
	Week 12	59 \pm 17	68 \pm 22	69 \pm 24		

COPD indicates chronic obstructive pulmonary disease; PLB, pursed-lips breathing; EMT, expiratory muscle training; 6MWD, 6-minute walk distance; SOBQ, Shortness of Breath Questionnaire; F value, Group \times Time interaction.

For both instruments, the lower the score, the less dyspnea. Values are mean \pm standard deviation.

* $P \leq .05$.

Table 3 • FUNCTIONAL PERFORMANCE MEASURES AT BASELINE, WEEK 4, AND WEEK 12 FOR 3 COPD GROUPS

Group Variable	Time	PLB	EMT	Control	F	P
Human Activity Profile						
Maximal activity score	Baseline	64 ± 12	65 ± 9	60 ± 12	0.47	.76
	Week 4	65 ± 10	67 ± 10	61 ± 11		
	Week 12	65 ± 10	64 ± 10	56 ± 15		
Adjusted activity score	Baseline	44 ± 16	45 ± 15	44 ± 15	1.27	.29
	Week 4	51 ± 15	44 ± 13	44 ± 15		
	Week 12	48 ± 15	47 ± 10	42 ± 15		
SF-36						
Physical health score, physical function domain	Base	21 ± 13	32 ± 15	29 ± 2	3.35	.02*
	Week 4	33 ± 16	35 ± 17	34 ± 23		
	Week 12	37 ± 24	27 ± 16	31 ± 18		

COPD indicates chronic obstructive pulmonary disease; PLB, pursed-lips breathing; EMT, expiratory muscle training; SF-36, Short Form 36-item Health Survey; F value, Group × Time interaction.

Higher scores indicate better functioning. Values are mean ± standard deviation.

* $P \leq .05$.

expiration. In a recent investigation, dyspnea relief with PLB during exercise was associated with decreases in end-expiratory lung volume coupled with lower tidal volume.³³ For this study, only the PLB subjects were observed by the research team to consistently use prolonged exhalation during the measurement of 6MWD even though both PLB and EMT subjects were instructed on paced walking. Although changes in breathing pattern at rest were not found, other studies have documented changes in breathing pattern that occur with PLB. Garrod et al³⁴ reported reduced breathing frequency postincremental shuttle walk tests in 69 COPD patients. In a study of 30 COPD patients, a slower breathing frequency with PLB as compared with diaphragmatic breathing or spontaneous breathing at rest was documented.³⁵ Similar changes in breathing patterns during PLB correlated with decreases in end-expiratory rib cage and chest wall volume in 22 COPD patients.³⁶

Another feasible physiologic mechanism is a sustained increase in inspiratory muscle strength over time for the PLB group (Figure 2b). With greater inspiratory muscle strength, less force is generated with each breath, which may reduce motor output to the respiratory muscles and decrease the perceived sense of respiratory effort.³⁷ This may explain the improvement in the more global measure of dyspnea (SOBQ) and physical function (SF-36).

Less distance covered with the 6MWD can be excluded as one reason for less exertional dyspnea as there was no significant Group × Time interaction for the 6MWD. Increased oxygen saturation as a source of

less dyspnea is also unlikely because oxygen desaturation occurred between the start and end of 6MWD at each of the time intervals.

The data did not support significant differences among groups for the SOBQ, the second dyspnea measure. One explanation may be the complexity of transferring the technique of prolonged expiratory time to activities other than walking. The SOBQ score reflects shortness of breath while performing 21 different activities of daily living. The protocol did not include any specific instruction regarding implementation of breathing pattern changes with activities other than paced walking.

Further studies with a larger sample size are required to validate the primary finding of reduced exertional dyspnea and to identify the changes associated with PLB. Subject dropouts reduce the power of the study and limit generalizability of the findings. Generalization to women and nonveterans is also limited because the sample was primarily male veterans from a large urban healthcare system. Future studies would include measures which may better clarify the mechanisms for dyspnea reduction with PLB, such as inspiratory capacity, the duty cycle, pace, and thoracoabdominal changes during walking.

CONCLUSION

This is the first randomized controlled study that supports the use of breathing pattern retraining to reduce exertional dyspnea in COPD patients. Two methods for

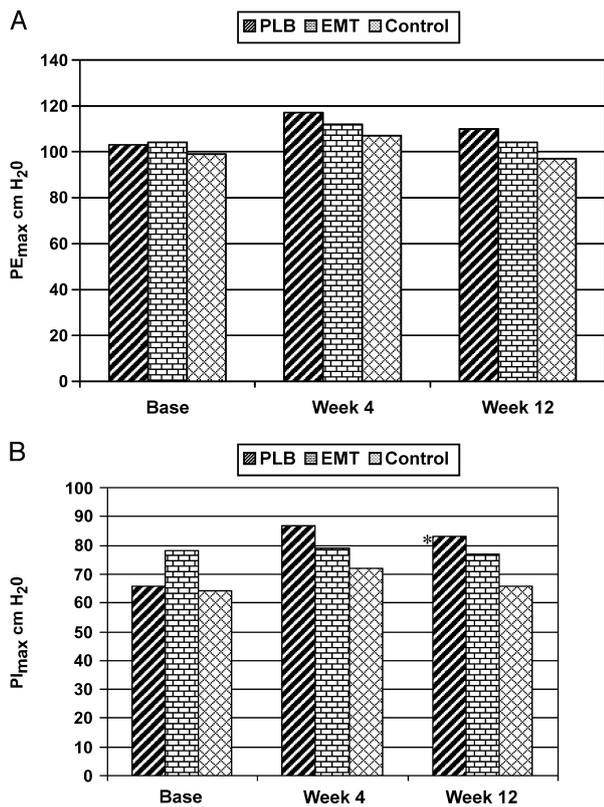


Figure 2 (A) Expiratory muscle strength at baseline, week 4, and week 12 for 3 COPD groups. (B) Inspiratory muscle strength at baseline, week 4, and week 12 for 3 COPD groups. PLB indicates pursed-lips breathing; EMT, expiratory muscle training.

prolonging exhalation (PLB and EMT) and a control were compared with PLB as the most effective. Pursed-lips breathing is a simple technique that can be used with all activities and without any of the restrictions or limitations associated with medication or devices. The benefit became evident at 12 weeks, but not at 4 weeks of training, suggesting the need for sustained practice. Further studies are required to clarify the mechanisms of PLB benefits and to confirm the findings of our investigation.

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APPENDIX A • INSTRUCTIONS FOR PURSED-LIPS BREATHING

1. Sit in a comfortable position. Relax your shoulders.
2. Take an easy breath in through your nose. Slowly and gently squeeze your air out through pursed lips. Keep a steady stream of air flowing through the center of your lips. Concentrate on breathing out as long as you can comfortably. Then gently breathe in through your nose.
3. Remember to relax and to not put much pressure in your chest. Think of making a candle flicker when you are breathing out.
4. Place your hands on the lower sides of your rib cage when you breathe in to help remember to “fill all around your waist.”
5. Use your pulse oximeter to watch the increase in your oxygen saturation %.
6. Practice in front of a mirror to remind yourself to keep your shoulders and upper chest still.
7. Practice 10 min/d total for the first week. Use frequent short practices during the day (eg, early morning, late morning, afternoon, evening). Increase the practice session time by 5-minute intervals to a maximum of 25 minutes total per day by the end of week 4. One session should last NO LONGER than 10 minutes.
 - 10 min/d the first week minimum
 - 15 min/d the second week minimum
 - 20 min/d the third week minimum
 - 25 min/d the fourth week minimum
8. Use the Daily Logbook to record your home practice sessions and any unexpected events.
9. Bring the Daily Logbook to every research appointment.