SYSTEMATIC REVIEW

The role of breathing techniques in the management of asthma: A systematic review

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Abstract

Objective: To determine the effectiveness of breathing techniques in the management of asthma.

Method: The systematic review was conducted from July 2021 to August 2022, and comprised search on PubMed, Google Scholar, and MEDLINE databases using the population-intervention-control-outcomes format and Boolean operators. Relevant randomised controlled trials published in the English language in the preceding 10 years were included. The last literature search was done on January 15, 2022. To evaluate the bias in studies, the Cochrane risk of bias tool was used. PEDro scale was used to assess the quality of the trials analysed.

Results: Of the 250 studies initially identified, 11(4.4%) random controlled trials were analysed in detail. The quality of methodology was high, and the studies reported significant improvement with the use of breathing techniques in symptoms of asthma and quality of life along with a decrease in the use of bronchodilators.

Conclusion: Literature supported the use of breathing techniques in the management of asthma.

Keywords: Asthma, Breathing technique, Physiotherapy, Quality of life, Symptoms of asthma. (JPMA 74: 1296; 2024)

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Introduction

Asthma is the most common obstructive lung disease affecting 1-18% of the population. According to the report of the Global Initiative for Asthma (GINA), about 300 million people suffer from asthma irrespective of age and ethnic backgrounds.[1] Its global prevalence in adults ranges 1-21% and in children aged 6-7 years, it is up to 20%.[2] It is considered among the top 5 serious lung illnesses.[3]

Asthma is a heterogeneous disease, usually characterised by chronic airway inflammation, wheezing, shortness of breath, chest tightness, cough, nasal congestion and sleep disturbance, that vary over time and in intensity.[4,5] These symptoms can be triggered by extrinsic (pollen, dust, house dust mites, feathers, occasionally food and drugs) and intrinsic (chronic bronchitis, stress or anxiety, and strenuous exercise) factors.[6] In the diagnostic evaluation of asthma, spirometry provides an objective evaluation of any airflow blockage.[7]

Practitioners have long recognised the relevance of physical exercise in the rehabilitation of lung patients. Physical therapy is believed to relieve symptoms of asthma. Breathing exercises and inspiratory muscle training are 2 useful physical therapy techniques for asthma that strengthen respiratory muscles, decrease airway inflammation, and increase bronchial patency.[8] Diaphragmatic breathing (DB), Buteyko breathing technique (BBT), nasal breathing, Papworth method, and pursed lip breathing are some of the most used breathing techniques for asthma patients. Physical training and aerobic fitness have also been proven to lower exercise-induced asthma symptom provocation thresholds, and reduce the amount of medication usage.[9,10]

The Buteyko method appears to be a promising therapeutic intervention based on clinical trials.[11] It is based on the carbon dioxide (CO_2) hypothesis of sickness, and its goal is to increase CO_2 levels as low levels are known to affect a variety of bodily systems in either directly or indirectly by potential of hydrogen (pH) disturbances, bicarbonate exhaustion, and tissue oxygen levels that are also decreased.[12,13]

Despite numerous benefits, the comparative role of breathing regimens on various symptoms of asthma needs to be explored. The current systematic review was planned to determine the role of breathing exercises in relieving the symptoms of asthma and improving the quality of life (QOL).

Materials and Methods

The systematic review was conducted from July 2021 to August 2022 in line with the Preferred Reporting Items of Systematic Review and Meta-analysis (PRISMA) guidelines.[14] The last literature search was conducted on January 15, 2022. The search strategy comprised PubMed, Google Scholar and MEDLINE databases using key terms and Boolean Operators (Table 1).

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Table-1: Keywords and Boolean Operators.

Sr. No	Search Terms
1.	Asthma AND breathing techniques OR Buteyko technique
2.	Asthma AND Breathing technique NOT COPD
3.	Asthma AND diaphragmatic breathing
4.	Asthma AND complementary and alternative medicine
5.	Asthma AND Papworth method OR pursed lip breathing
6.	#1 OR #3
7.	#1 OR #5

COPD: Chronic obstructive pulmonary disease.

The titles and abstracts of the identified studies were reviewed by 3 independent reviewers. The full text was reviewed by 2 authors in cases where eligibility could not be determined on the basis of the abstract.

The eligibility criteria were based on the population-intervention-control-outcomes (PICO) format.[15] Randomised controlled trials (RCTs) published in the English language in the preceding 10 years were included if they had children and adults diagnosed with moderate or severe asthma, comprised different breathing techniques, and the intervention lasted for at least 3 months. Unpublished studies and those conducted on pharmacological treatment and included other illnesses, such as heart disease or cancer, were excluded.

The quality assessment of articles was done using the PEDro scale,16 and risk assessment was done using the Cochrane risk of bias tool.[16]

Results

Of the 250 studies initially identified, 11(4.4%)17-28 (RCTs) were analysed in detail (Figure). The quality of methodology was high, ranging 6-9 (Table 2), and the studies reported significant improvement with the use of breathing techniques in symptoms of asthma and QOL along with a decrease in the use of bronchodilators (Table 3).

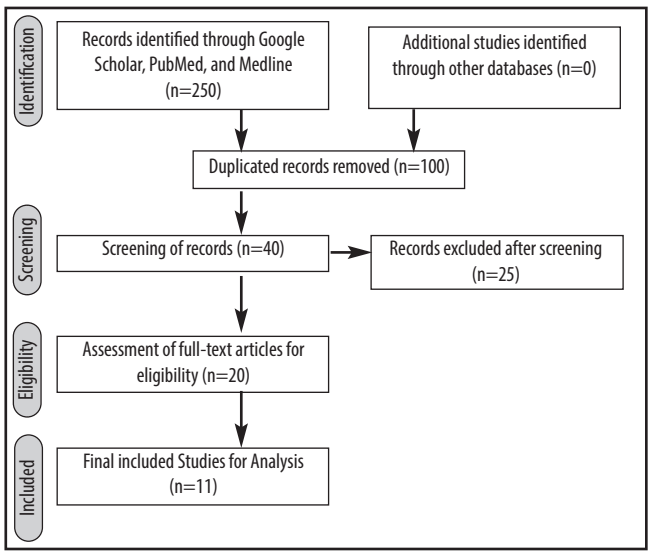

Figure: Preferred Reporting Items of Systematic Review and Meta-analysis (PRISMA) flow chart.

Discussion

There were 2,613 participants in the 11 studies reviewed, but they differed in terms of their characteristics (Table 3). The review found a feasible effect favouring the breathing method over controls in the form of asthma-related QOL (AQLQ) and asthma quality control (AQC) for up to 3 months.[29]

The participants included in the control and experimental groups showed improvement in symptoms of asthma by doing regular breathing exercises. To assess the difference between the two groups, a study showed that there was also a possible effect of breathing exercises on hyperventilation symptoms compared to the controls.[30]

All the studies involving the Buteyko breathing method showed the mean difference in tidal volume peak expiratory volume, minute volume, and decreased hyperventilation after an intervention of 6 months (Table 3). In some studies, pulmonary function test (PFT) and spirometry tests at the initial level and end of intervention

Table-2: Quality assessment of the studies reviewed using the PEDro scale.

Author Name	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Total Score
Esra Elwan[17]	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9
Jan Vagedes[18]	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	6
Yosreah Mohamed[19]	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	8
Eman Mahmoud Hafez[20]	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	6
Fatima Mohammad[21]	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	8
Kimita Huidrom[22]	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	6
Prasanna K. B[23]	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	7
Laily Widya Astuti[24]	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	6
Enrique Leones Macias[25]	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	7
Guitti Pourdowlat[26]	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	6
Arie Sulistiyawati[27]	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	6
Saee Khandagale[28]	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	7

Table-3: Characteristics of the studies reviewed.

References	Breathing technique	sample	Participants	Duration	Intervention	Outcome
Esra Elwan, Fawzia 2022[17]	Buteyko breathing technique	33	EG: 20 CG: 13	3 months	Buteyko breathing session for 4 weeks one session each week, measurement of PEFR	Reduction in asthma related symptoms, Improvement in LFT after 4 weeks, PEF, FEV1,
Jan Vagedes, 2020[18]	Buteyko breathing technique	197	32 EG: 16 CG: 16	5 months	Routine care treatment 5 days training of BBT each session lasted 90 minutes Booster session 3-month home practice	Change in bronchodilator uses, improvement in Measurement of spirometry values
Yosreah Mohamed 2019[19]	Buteyko breathing technique	100	100 EG: 50 CG: 50	4 months	10 sessions of BBT 4 sessions for a theoretical of 30 minutes and 6 sessions for practical section for 50 minutes, Assessment of AQLQ and ACQ	Post assessment after 1 month of BBT application, improved asthma symptoms and QOL
Yosreah Eman Mahmoud Hafez Mohamed 2018[20]	Buteyko breathing technique	50	50	6 months	Buteyko technique in sessions of 15 to 25 minutes for 3 months, Measurement of ACQ	Improvement of asthma severity, FEVI, PEFR improved
Fatma Mohmmed Ahmed Abouelala 2017 [21]	Buteyko breathing technique	90	EG: 45 CG: 45	12 months	AQLQ to asses asthma score, BBT session for 30-60 minutes, 4 sessions with one session each week	Improvement of total QOL score
Kimita Huidrom 2016 [22]	Buteyko breathing technique	60	EG: 30 CG: 30	4 months	Pre-Test (Pulse, respiratory rate, PEF), BBT session for 10 minutes thrice daily	Improved respiratory physiological parameters
Prasanna K. B 2015 [23]	Buteyko breathing technique	100	EG: 64% CG:60%	2-3 months	Breathing exercise twice a day (morning or evening) for 2 months	Improvement in PFT in terms of PEFR
Laily Widya Astuti 2022[24]	Diaphragmatic Breathing	38	EG: 18 CG: 15	4 months	Standard drug therapy, DB. Session 6 times a week for 2 weeks, measurement of PEF	Significantly increase in PEF
Enrique Leones Macias 2018[25]	Diaphragm Stretching technique	32	EG: 16 CG: 16	4 months	Respiratory pressure, lumbar mobility evaluated, Diaphragm stretching for 5-20 minutes	Improvement in maximum respiratory pressure
Guitti Pourdowlat 2019[26]	The Papworth method	30	EG: 15 CG: 15	6-12 months	Papworth relaxation session for 6 weeks, QOL and anxiety were assessed by SF36 and STAI questionnaire	Prevention of asthma attacks, improve stressful condition and QOL
Arie Sulistiyawati 2019 [27]	Pursed lip breathing	151	50 CG: 25 EG: 25	6 months	Pursed lip breathing sessions for 4 weeks	Reduce dyspnoea, increased PEF, comfortable breathing
Saee Khandagale 2014 [28]	Pursed lip breathing	60	EG: 30 CG: 30	1 month	For 1-week PLP performed along 4 puffs of salbutamol	ACQ on days 1 and 8 PEFR

EG: Experimental group (group in which breathing techniques were performed); CG: Control group (conservative treatment); PEFR: Peak Expiratory Flow Rate; LFT: Lung Function Test; PEF: Peak Expiratory Flow; FEV1: Forced expiratory volume in 1 second; BBT: Buteyko breathing technique; AQLA: Asthma Quality of Life Questionnaire; ACQ: Asthma Control Questionnaire; PFT: Pulmonary function test; DB: Diaphragmatic breathing; QOL: Quality of Life; SF36: Short Form 36 questionnaire to assess health related quality of life; STAI: State-Trait Anxiety Inventory; PLP: Pursed Lip Breathing; PEFR: Peak Expiratory Flow Rate.

showed significant improvement in hyperventilation. Peak expiratory flow rate (PEFR) in terms of pulmonary function also improved (Table 3). Therefore, the Buteyko breathing technique can be said to play an important role.[10]

The studies suggested that DB improved QOL based on the reduction in hyperventilation, which physiologically improved the respiratory function. The exact usefulness of DB in clinical practice is unclear due to the poor quality of studies. However, it may be a feasible and practical treatment method for various disorders Further studies are required to clarify the effect of DB on asthma patients.[31]

A recent study on breathing techniques in the management of asthma supported the hypothesis that breathing techniques can be added to the management of asthma along with pharmacological treatment.[32] All 12 studies included used different types of breathing techniques and with different interventions. Although the methodologies of the studies were different, they all supported the evidence of the ability of breathing techniques to relieve the indication of asthma and improve QOL. Among the breathing strategies used in asthma control, the BBT received the most attention. However, none of the BBT studies showed a significant increase in lung function (Table 3), which could explain the outcomes.[33]

Limitations: The current systematic review had limitations as it did not evaluate the effects of breathing techniques in relation to the severity of asthma. Also, the studies reviewed determined the effects of breathing exercises for up to 6 months, and, hence, the long-term effects were missing. The systematic review was not registered with PROSPERO which could amount to a slight deficiency in monitoring of the study.

Conclusion

The subjects that were part of the studies reviewed showed improvement in their breathing and activities of daily living, while the use of inhalers decreased. From all the breathing techniques explored, the Buteyko breathing technique could relieve the symptoms of asthma with QOL improvement the most compared to the other techniques.

In addition to relief in symptoms, breathing techniques also improved the breathing pattern of the patients.

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Author Contribution:

SNZ: Stude design and research questionnaire.
MK: Literature review and study gap.
AJ: Data analysis and drafting.
SKB: Quality of RCT and risk analysis.
AM: Data interpretation.
MN: Analysis of included RCTs in study.