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A NARRATIVE REVIEW ON THE EFFECT OF DIAPHRAGMATIC BREATHING EXERCISE ON PULMONARY FUNCTION IN SMOKERS

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Abstract

Background: Determining if diaphragmatic breathing exercises enhance pulmonary function in smokers was the goal of this narrative review. Further research is necessary, though, to fully understand how diaphragmatic breathing affects a smoker's lungs.

Methods: To find the most recent data on the impact of diaphragmatic breathing exercises on smokers' pulmonary functioning, the author searched PubMed and Google Scholar.

Results: The original articles included in this review were randomly selected from systematic reviews. In patients with chronic obstructive pulmonary disease (COPD), diaphragmatic breathing appears to be helpful, suggesting roving exercise capacity and respiratory performance.

Conclusions: This narrative review found that the poor quality of research made it difficult to determine exactly how effective diaphragmatic breathing is in clinical use. However, it might be a doable and useful therapeutic strategy for various disorders.

Keywords: Diaphragmatic Breathing, Lung Function Capacity, Smokers

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INTRODUCTION

Smoking can impair pulmonary functioning and cause oxygen deficiency in cells due to increased blood levels of carbon monoxide and decreased oxygen-carrying capacity of hemoglobin. Smoking can also impair physical fitness and exercise capacity [1] Smoking is regarded as one of the leading causes of death because just one cigarette can reduce life expectancy by 11 minutes [2,3] Ninety percent of smokers start before they turn 25.4 Smoking has become more prevalent among young people, which leads to early pulmonary function issues [5,6]

Smokers need to keep the muscles involved in breathing in sync to increase their air intake. These muscles stimulate rib expansion and diaphragm descent during inspiration, boosting air influx into the lungs. During expiration, these muscles relax, allowing air to escape the lungs.

Dyspnoea can be brought on by weak breathing muscles, which also makes it harder to exercise. Therefore, treatment measures are required to augment respiratory muscle functioning and improve breathing and exercise capacity [8,9] Smoking is fatal to health since it contains toxic compounds that provide the groundwork for numerous fatal conditions like asthma, COPD, bronchitis, and cardiovascular disorders, among others [10]

Pulmonary functions are gradually harmed by cigarette smoking. As a result, roughly 15-20% of smokers have chronic obstructive lung problems, 50% have chronic bronchitis symptoms, and only 30% are healthy smokers [11] Since diaphragmatic breathing allows for a proper exchange of oxygen and carbon dioxide, it is a useful technique for breathing and relaxing the lungs. It is reportedly useful in alleviating back pain [14] spine correction [15]

abdominal strengthening [16] improving breathing efficiency, dyspnoea, and activity capacity [13] reducing metabolic acidosis, and improving body composition and flexibility [17]

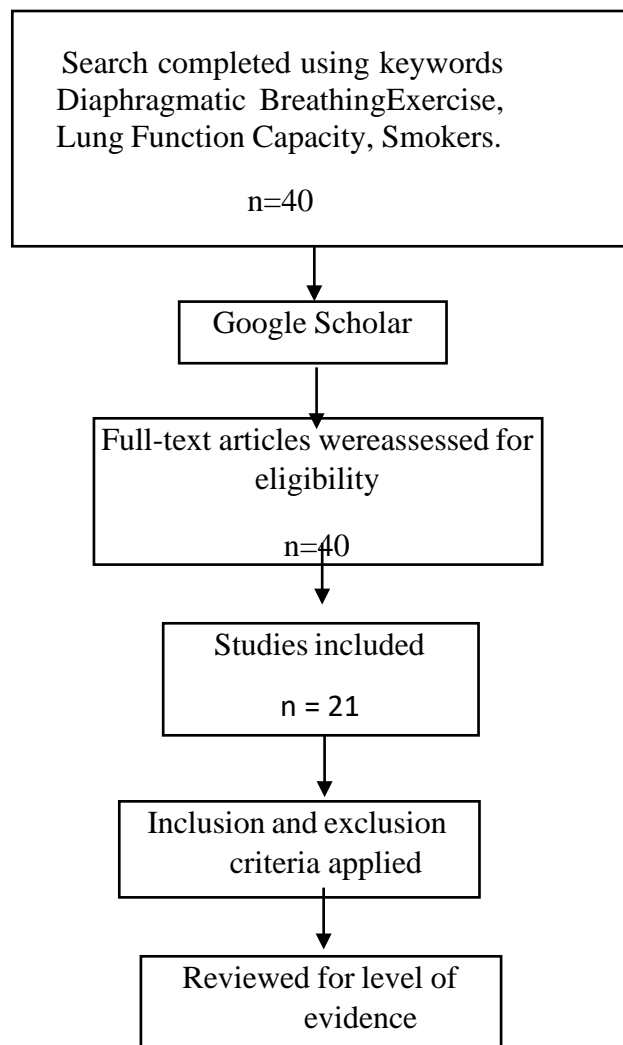
Diaphragmatic breathing, also known as belly breathing, is a slow, deep breathing technique that should not be viewed as only a breathing control [18] Diaphragmatic breathing is described as taking slow, deep breaths through the nostrils while moving the chest as little as possible when reclining and with one hand on the chest and the other on the belly [19] Yoga practitioners and practitioners of traditional martial arts like tai chi use diaphragmatic breathing as a vital technique during meditation sessions. A recent comprehensive review found that yoga and tai chi help lower stress in people who are experiencing high levels of stress or negative emotions by altering the sympathetic-vagal balance [20]

Even though breathing exercises are effective in treating conditions like chronic obstructive pulmonary disease (COPD) [21,22] asthma, [23,24] postoperative pulmonary function [25,26] and cardiorespiratory function in Fontan patients [27] more research is still needed to determine how diaphragmatic breathing affects conditions like cancer, heart failure, and anxiety. Since there hasn't been much research on how diaphragmatic breathing exercises affect smokers' capacity to breathe deeply, this narrative review is important.

LITERATURE SEARCH METHODOLOGY

Google Scholar and PubMed are the two online search engines used to gather journals. Based on the keywords, the authors located the articles.

The complete texts of the articles were gathered. A total of 40 articles were found, and 21 were chosen for examination. [Fig-1]



STUDY SELECTION

Inclusion criteria: (1) Articles published in English language only; (2) Diaphragmatic breathing: smokers only; (3) Articles from 2005-2022 have been taken.

Exclusion criteria: (1) Articles published in other languages; (2) Articles published below the year 2004.

Sr. No.	Author	Title	Year	Study Design	Conclusion
1	Dr. Vaidik P.Rupareliya etal ⁽²⁸⁾	Immediate effects of slow pranayama on cardiorespiratory parameters in young adult tobaccosmokers	2022	Original Article	The study can conclude that slow pranayama shows statistically significant improvement in Respiratory rate and SPO2
2	Ali Albarratiet al ⁽²⁹⁾	The immediate effect of thoracolumbar manipulation and diaphragmatic release on inspiratory muscle strength in healthy smokers	2022	Original Article	The diaphragmatic release technique and thoracolumbar manipulation increased the diaphragm strength in healthy adult smokers, suggesting its potential utility in the management of participants with reduced respiratory muscle strength.
3	Wassim Melliti ⁽³⁰⁾	Effect of Six-Minute Walk Test and Incremental Exercise on Inspiratory Capacity, Ventilatory Constraints, Breathlessness and Exercise Performance in Sedentary Male Smokers without Airway Obstruction	2021	Original Article	The study has been able to detect the development of DH in smokers during submaximal exercise such as the 6MWT and more pronouncedly during incremental CPET. IC Measurements were taken during exercise supplement standard measurements of ventilatory limitation and may provide further insight into exercise intolerance in smokers with preserved spirometry
4	Hidetaka Hamasaki ⁽³¹⁾	Effects of Diaphragmatic Breathing on Health	2020	Narrative Review	Diaphragmatic Breathing may also be beneficial for reducing both physiological and psychological stress and could improve respiratory function and respiratory muscle strength
5	D. Lavanya Suhasini ⁽³²⁾	A Study to Assess the Effectiveness of Diaphragmatic Breathing Exercise in COPD Patients	2020	Original article	The researchers conclude that DBTP in patients with COPD leads to improvements in abdominal motion during NB and functional capacity. The researchers also showed that patients with a baseline level predominance of costal breathing and worse diaphragmatic mobility experienced a greater improvement

					in abdominal motion.
6	Iman Zahra et al ⁽³³⁾	Effects of Breathing Exercises on Lung Volumes and Capacities Among Smokers	2020	Original Article	It was concluded that deep breathing exercises are useful among smokers. As deep breathing helps in improving lung volumes and capacities.
7	Özgür Bostanci et al ⁽³⁴⁾	Inspiratory muscle training improves pulmonary functions and respiratory muscle strength in healthy male smokers	2019	Original Article	IMT significantly improved the respiratory muscle strength and pulmonary function of smokers. The mechanism responsible for this improvement is associated with increased respiratory muscle strength. On the other hand, smokers had higher increments in respiratory muscle strength and pulmonary functions than non-smokers.
8	Ji Won Han et al ⁽³⁵⁾	Effect of breathing exercises combined with dynamic upper extremity exercises on the pulmonary function of young adults	2018	Original Article	The result is that breathing exercise with dynamic upper extremity exercise improves pulmonary function. Findings indicate that the breathing and dynamic upper extremity exercise described should be considered in patients who require breathing therapy since it seems to have beneficial effects on pulmonary function.
9	Kyo Chul Seo ⁽³⁶⁾	The effects of inspiratory diaphragm breathing exercise and expiratory pursed-lip breathing exercise on chronic stroke patients' respiratory muscle activation	2017	Original Article	The respiratory rehabilitation exercises is considered to be capable of inducing positive effects on stroke patients' respiratory muscles through the diaphragm breathing exercise and lip puckering breathing exercise.
10	Min-Sik Yonget al ⁽³⁷⁾	Effects of diaphragm breathing exercise and feedback breathing exercise on pulmonary function in healthy adults	2017	Original Article	Diaphragm breathing exercises and feedback breathing exercises can affect respiratory function

11	Hyun-Ju Jun et al ⁽³⁸⁾	Effects of breathing exercises on lung capacity and muscle activities of elderly smokers	2016	Original Article	The results show that FBE and BBE improved the pulmonary functions of elderly smokers
12	Amany F. Elbehairy et al ⁽³⁹⁾	Mechanisms of exertional dyspnoea in symptomatic smokers without COPD	2016	Original Article	Regardless of the nature of the underlying physiological impairment in individual smokers, higher dyspnoea intensity ratings at a given work rate compared with controls were associated with higher contractile diaphragmatic effort and fractional inspiratory neural drive to the diaphragm
13	Kyo Chul Seo et al ⁽⁴⁰⁾	Effects of diaphragm respiration exercise on pulmonary function of male smokers in their the twenties	2015	Original Article	The experimental group which performed diaphragm respiration exercises showed a greater improvement in pulmonary function as compared to the control group.
14	Hyun ju Jun et al ⁽⁴¹⁾	Comparison of the Impact of Breathing Strengthening Exercises and Balloon Blowing Training on the Pulmonary Function of Elderly Smokers	2015	Original Article	FBT and BBT had a positive impact on the pulmonary function and minor respiratory muscles of an elderly smokers-home home breathing rehabilitation program.
15	Eldho Varghese ⁽⁴²⁾	Effectiveness of Diaphragmatic Breathing Exercise and Pursed Lip Breathing Exercise in Reducing Dyspnea in Patients with Acute Bronchial Asthma	2013	Thesis	There is a significant reduction of dyspnea in acute asthmatic exacerbations along with bronchodilators using two breathing exercise training, in which pursed lip breathing training is more effective in the aspect of reduction of dyspnea than diaphragmatic breathing exercise.
16	Hyolyun Roh et al ⁽⁴³⁾	Respiratory Muscle training of pulmonary function for smokers and non-smokers	2012	Original Article	Respiratory muscle training was proven to be effective at improving pulmonary function.

17	Jeena Princy, D ⁽⁴⁴⁾	A study to analyze the effect of various positions along with coughing and huffing techniques on respiratory parameters in smokers	2012	Thesis	This study concludes that there is a significant improvement in FEV1, FEV1/FVC, and FEV1/FEV6 following the interventions of coughing and huffing techniques in smokers
18	Manuel Gimenez et al ⁽⁴⁵⁾	Bilevel exercise training and directed breathing relieves exertional dyspnea for male smokers	2012	Original Article	This study suggests that the decline in exercise tolerance for male smokers can be reduced by intensive exercise training (SWEET) and comprehensive directed breathing but not by moderate training and traditional diaphragmatic breathing.
19	Kateřina Burianova et al ⁽⁴⁶⁾	The Effect Of 8 Week Pulmonary Rehabilitation Programme on Chest Mobility and Maximal Inspiratory and Expiratory Mouth Pressure in Patients with Bronchial Asthma	2008	Original Article	From the given results it can be concluded that a combination of special breathing and postural exercises and mobilization and soft tissue techniques has a positive effect on the chest mobility and respiratory muscle strength of AB patients.
20	Mervat A. Mohamed et al ⁽⁴⁷⁾	Effect of Two Deep Breathing Techniques on Arterial Blood Gases in Smoker and Non-Smoker Patients after CABG	2005	Original Article	This study concluded that the current study revealed that both modalities resulted in improving arterial oxygenation with the superiority of IS to Diaphragmatic Breathing.
21	Yoshio Kobayashi et al ⁽⁴⁸⁾	Effects of Habitual Smoking on Cardiorespiratory Responses to Sub-maximal Exercise	2004	Original Article	The present study indicates that habitual cigarette smoking has a significant detrimental effect on cardiorespiratory functions during moderately heavy exercise related to decreased O ₂ carrying capacity. However, more subtle effects are already apparent at lighter exercise levels in the form of inefficient pulmonary and tissue gas exchange, as manifested by elevated V _E /V _{O2} ratios, reduced O ₂ pulse values, and a slower HR recovery following exercise.

DISCUSSION

Diaphragmatic Breathing exercise has various physiological effects on humans. The diaphragm is the major respiratory muscle. The movement of the diaphragm has a positive correlation with the lung volume using the diaphragm consciously during respiration increases the lung capacity.

India is currently experiencing a steady increase in the smoking rate. In all likelihood, this population is at a greater risk of developing respiratory diseases in the future. Respiration training in addition to psychological and medical treatments should be an active intervention in any anti-smoking program; however, in reality, the approach to professional respiration training is very limited and depends on simple respiration exercises.

These breathing exercises are learned easily; a person can perform these exercises at any time and any place. Some studies have shown significant progresses in pulmonary function with diaphragmatic breathing techniques.

The study was conducted to determine the effectiveness of diaphragmatic breathing exercises on pulmonary function among smokers. The study showed improvement in some parameters and others remain the same. Significant improvement was seen in vital capacity, forced expiratory volume, and oxygen saturation while other parameters were not significantly improved.

The conducted study supports the current study that deep breathing exercises are operational for intercostal muscles which help to improve breathing, lung capacities and volume, oxygen saturation, and ultimately the quality of life.

Other studies show that deep breathing exercises effectively reduce stress and improve mood. Research shows that deep breathing exercises are very effective in obstructive lung diseases as the above-mentioned research indicates. In another study that was conducted in 2016, the Blowing balloon workout is an operative way of improving lung functions and relieving stress in medical students. The above-mentioned studies support the current study that deep breathing exercises were beneficial in improving lung functions. These exercises are also useful in improving the partial pressure of oxygen. Deep breathing exercises work as anti-smoking and deliver essential evidence for exercises and provide valuable directions for the development of interventions that help in smoking cessation.

There is a lack of awareness among people regarding exercises and their useful effects, so they did not follow the exercise plan properly, there is a need to give awareness.

CONCLUSION

Previous original Articles and systematic reviews have shown that Diaphragmatic Breathing exercise is effective in improving pulmonary functions. the exercise capacity and RR in patients with COPD. On the other hand, Diaphragmatic Breathing could also deteriorate dyspnea in severe COPD patients. Moreover, Diaphragmatic Breathing exercises may also be beneficial for reducing both physiological and psychological stress and could improve respiratory function and respiratory muscle strength, but more firm evidence will be needed in the future.

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