

An Effect of Singing for Lung Health in Patient with Chronic Obstructive Pulmonary Disease: An Evidence-Based Review

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ABSTRACT

INTRODUCTION: Chronic Obstructive Pulmonary Disease is characterized by airflow limitation that is not fully reversible, is usually progressive, and is associated with an abnormal inflammatory response of the lungs to noxious particles or gases. ‘Singing for Lung Health’ (‘SLH’) incorporates breathing and vocal exercises comparable with those used by respiratory and speech and language therapists to support optimum breathing and vocalizing.

AIM OF STUDY: To find the effect of Singing for Lung Health in a patient with chronic obstructive pulmonary disease.

Methodology: Articles from different search engines like PubMed, Google Scholar, and Research Gate are being reviewed. Articles from 2018-2022 and those which are published in English and had open access are included.

RESULT: Articles reviewed showed a positive effect of Singing on Lung Health.

CONCLUSION: From the articles reviewed it can be concluded that Singing for lung health (SLH) plays an important role in improving lung function and quality of life in Chronic Obstructive Pulmonary Disease patients. SLH improves the well-being, confidence of the patient, sleep quality, minute ventilation, breath volume, breathing pattern, Hyperinflation, Inspiratory muscle strength, and functional capacity in a patient with COPD and reduce Dyspnoea score, Anxiety, Depression and Health care utilization in a patient with COPD. It can also be incorporated as a group rehabilitative program in the Physiotherapy field. There are very few recent evidences

supporting this topic so more researches should be conducted on it.

KEY WORDS: COPD, Singing for Lung Health, Music therapy

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) refers to a disease state characterized by the presence of incompletely reversible airflow obstruction. GOLD (Global Initiative for Chronic Obstructive Lung Disease) guidelines define COPD as “airflow limitation that is not fully reversible, is usually progressive, and is associated with an abnormal inflammatory response of the lungs to noxious particles or gases.”^[1] In 2019, COPD has the third leading mortality rate globally, with more than 3.23 million deaths, the majority occurring in low-and middle-income countries.^[2] It is assumed that by 2030 it may become the second leading cause of global mortality.^[3] Estimates of the number of cases of COPD in countries of the World Health Organization South-East Asia Region had increased from 44.5 million to 75.1 million between 1990 and 2010, a 68.8% increase.^[2]

Dyspnea, cough, mucus production, fatigue, and pain are symptoms of COPD, and individuals may suffer from co-morbid anxiety, depression, and panic leading to social isolation, loneliness, and loss of

identity. [4] persistent respiratory symptoms including breathlessness on exertion and productive cough, and airflow limitation that is not fully reversible. Chronic inflammation results in structural changes to the small airways and diminished lung elasticity, with a reduced ability to remain open in expiration. [5] Progression of COPD leads to an increase in the severity and magnitude of symptoms, resulting in significant disability and negative effects on the quality of life, with high rates of anxiety and depression, even in moderate disease. Although pulmonary rehabilitation (PR) has been shown to produce clinically significant improvements in health-related quality of life, as well as exercise capacity, PR programs are of limited duration, and waiting lists are often long. PR does not always fit with participants' perceptions of health. [5]

The GOLD guidelines state that PR is an important method to improve COPD symptoms like dyspnea, health status, and exercise endurance. Individuals with COPD declined PR because it did not fit their perception of health, and they worried that participation may be time-consuming and conflict with daily activities. Thus, improving the adherence of patients with COPD to PR, reducing symptoms, and promoting quality of life and functional ability are urgent problems that need to be resolved. [6]

Health-related interventions within a self-management model of care need to be sufficiently attractive to the individual and have the potential to be sustained beyond the program itself. One such intervention is singing. Group singing has been an integral element in research projects exploring its value for people living with a range of long-term conditions such as Parkinson's Disease and enduring mental health problems. [7] Group singing has been found to improve holistic well-being through mechanisms to address a number of biopsychosocial facets. [4] The specific methodological concept of "Singing for Lung Health" (SLH) was developed in the UK and has become

increasingly popular, although a heterogeneous singing approach is applied in other countries. [8]

For lung conditions, an adjunct treatment given with a regular rehabilitation program is music therapy which is low-cost, enjoyable and undertake virtually anywhere. Music therapy involves breathing exercises that can decrease bronchial resistance. Listening to music also called passive music therapy can reduce dyspnea and anxiety as listening songs or music give a soothing and relaxing effect. [6] music therapy consisting of singing can significantly increase oxytocin neuropeptide, a key hormone involved in human social and emotional processing. And music therapy was associated with enhanced human immune function through the secretion of immunoglobulin A. [6]

SINGING FOR LUNG HEALTH

The group singing program was structured for an individual with chronic respiratory conditions, which includes a physical warm-up, joint range of motion exercise special for the upper limb, thoracic mobilization, breathing exercises, posture and respiratory muscle use, voice fricatives likes (vvv, fff, sss), different vocal qualities such as range, dynamics, timbre, pitch, and rhythm. For rhythm and pitch, games with formal singing exercises, and various melodic patterns with a long exhalation is given and at the end, cool-down exercises were given. Home practice sessions will be taught after that. [9] The Singing for Better Breathing Self-Management Resource (SfBB Resource), was developed as a practical tool for participants to use at home between singing sessions. [5] The DVD resource included thirteen short films, each featuring a group of singers providing audio and visual guidance for the viewer. The first film led the viewer through a series of physical and vocal warm-ups, guided by a narrator and demonstrated by the singers. Each subsequent film provided the audio of a song with scrolling lyrics, behind which the faces of singers could be seen in soft

focus. Songs were chosen to gradually demand greater vocal production and breath control, and a handbook was provided with the DVD which included printed lyrics as an alternative format to those on the screen. [5]

Another way for singing for lung at the clinic:

Relaxation exercises: Relaxation exercises are given mostly for neck and abdomen muscles. For neck muscle relaxation individuals try to lower their head and try to position the chin against the chest for 10 seconds. For abdominal muscle relaxation individuals gradually lift their arms upward above the head and simultaneously inhale and gradually down their arms while exhaling quietly and slowly. Relaxation exercises are given for at least 5 min.

Respiratory exercises: Specific breathing exercise that is pursed-lip breathing and diaphragmatic breathing instructed for 10 min.

Vocalization exercises: Vocalization exercises are given to achieve breath and voice coordination. Vocalize slowly whispered hum and loud hum respectively. Vocalization exercises are given for 15 min.

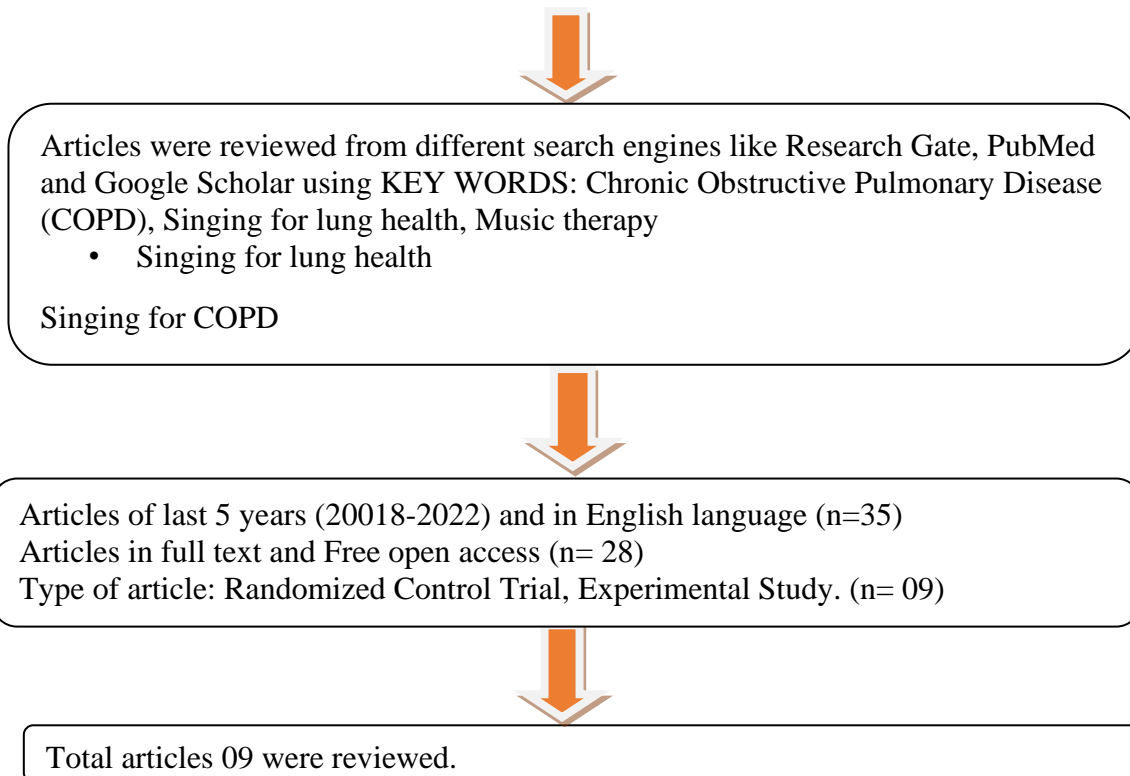
Singing exercises: Important part of singing therapy, an individual selects song from a list of participants chosen music selection on each occasion like folk, classical, familiar, and happy songs. At first, the music therapist taught individual how to sing with breathing control and then practice singing for at least 30 min every day. [10][11]

Table 1: Singing Exercise [5]

Component Number	Component Name
1	Rest
2	Physical Warm up
3	Rhythm exercise, Seated singing
4	Pitch exercise, Seated singing
5	Vocal fricatives, Focusing on constant vocalisation
6	Song repertoire, Standing singing
7	Rest

METHODOLOGY:

MATERIALS AND METHODOLOGY



➤ **INCLUSION CRITERIA:**

- Articles of last 5 years.
- Articles available in English language, full text articles and Free open access.
- Randomized Control Trial, Experimental Study.
- Patients with COPD

➤ **EXCLUSION CRITERIA:**

- Other Cardiorespiratory conditions were also excluded.

REVIEW OF LITERATURE

AUTHOR/YEAR OF PUBLICATION	TITLE	TYPES	METHODOLOGY	CONCLUSION
Mette Kaasgaard, et al. 2022 ^[12]	Physiological changes related to 10 weeks of singing for lung health in patients with COPD	A Randomized controlled trial	Subjects: - 195 Groups: - group 1: SLH group(n=108) group 2: physical exercise training (n=87) Time: - 90 min twice weekly over 10 weeks; Outcome measures: FEV1, FVC, FEV1/FVC as a percentage), forced expiratory flow (FEF25%-75% (L/s)), maximum inspiratory pressure (MIP), single breath count test, breath holding test, Modified Medical Research Council Dyspnea Scale, modified BORG-CR10- Dyspnoea Scale, and baseline performance in 6MWD and SGRQ total score.	This study suggests that SLH as part of PR for COPD confers positive physiological changes besides being a pleasant leisure time activity.
Stephen Clift et al. 2022 ^[7]	Singing and COPD: a pilot randomized controlled trial of wellbeing and respiratory outcomes	a pilot randomized controlled trial	Subjects: - 24 M/F both Groups: - Group 1: SLH group (n=13) Group 2: control (usual treatment) (n=11) Time: singing program once a week and home practice for ten weeks. Outcome measures: CAT, breathlessness scale, SF-36 v2, GAD-7, PHQ-9.	This study concluded that there significant effect of SLH on perceived activity and mental health in patient with COPD.
Sonia Price et al. 2022. ^[5]	Singing and COPD: Development, implementation and evaluation of a resource to support home practice and disease self-management	Interventional study	Subject: 20 Group: group 1: SLH group (n=10) Group 2: Training as usual(TLA)group(n=10) Time: 10 weeks Outcome measures: Participant's experience and Interview regarding COPD condition.	COPD can be improved through promoting self-efficacy and self-management of the condition by use of the Singing for Better Breathing Self-Management Resource.
Mette Kaasgaard et al. 2021 ^[8]	Use of Singing for Lung Health as an alternative training modality within pulmonary rehabilitation for COPD: a randomised controlled trial	A randomized controlled trial	Subjects: 20, 10 in each group Groups: group 1: SLH group Group 2: physical exercise training Time: 90 min twice weekly over 10 weeks. Outcome measure: 6-MWT, (SGRQ); HADS, FEV1, mMRC dyspnea scale and modified Borg category-ratio (Borg-CR10).	This randomized controlled trial demonstrated that SLH provides positive and clinically relevant physiological and psychological changes in COPD.
Roisin Cahalan, et al. 2021 ^[4]	“Sing Strong”: Singing for better lung health in COPD – A pilot study	A pilot study	Subject: 106, 18-99 years Time: 1 hour daily, 8 weeks Outcome measures: 6 MWT, CAT, HADS, Spirometry,	This study concluded that statistically significant improvement in walking distance and overall health of patient with COPD.
Keir EJ Philip et al. 2021 ^[11]	Physiological demands of singing for lung health compared with treadmill walking.	Non-blinded Observational study	Subject: 8, 18-99 years Time: 12 weeks Outcome measures: VO ₂ , MET, Heart Rate, Minute Ventilation, Respiratory Rate, Volume per Breath, Borg Dyspnea scale, Borg rate of perceived exertion scale, and tidal carbon dioxide.	The study identified increases in minute ventilation and breath volumes during singing.

Keir EJ Philip et.al 2020 ^[13]	Moving Singing for Lung Health online: experience from a randomized controlled trial	A randomized controlled trial	subjects: 18, 9 in each group Groups: group 1: SLH group group 2: usual care Time: 12 weeks, once a week Outcome measures: SF 36, ABC scale, GAD-7, PHQ-9, CAT score, MRC dyspnoea score physical activity in COPD tool (cPPAC).	This study suggests that group singing sessions produce clinically significant impacts on depression scores, anxiety, and improve balance confidence in people with COPD.
Adam Lewis et al. 2018 ^[9]	Singing for Lung Health: service evaluation of the British Lung Foundation programme.	Survey study	Subjects: 228, 70.7yrs Time: 12 weeks. Outcome measures: MRC dyspnoea score, CAT, PAM, GAD-7, The EuroQOL.	This can be concluded that SLH can improve respiratory health-related quality of life and a reduction in healthcare utilization. SLH has potential economic and health benefits.
Hua Liu et al. 2019 ^[10]	Group singing improves depression and life quality in patients with stable COPD: a randomized community-based trial in China	A randomized community-based trial	Subjects: 60, 63.85 ± 4.25 years Groups: Group 1: Group singing with usual health education. (n=30) Group 2: Usual health education(n=30) Time: once a week for 24 sessions Outcome measures: HADS-D, CCQ,	It can be concluded that the group singing therapy may help decrease depressive symptoms and improve quality of life. it is enjoyable experience and well accepted by the participants.

*6MWT: 6 Minute Walk Test

*SGRQ: St George's Respiratory Questionnaire

* CAT: COPD assessment test

* SF-36 v2: Short Form-36

* GAD-7: Generalized Anxiety Disorder scale

* PHQ-9: Patient Health Questionnaire

* HADS: Hospital Anxiety and Depression Scale

* FEV1: Forced Expiratory Volume in 1 sec

* MET: metabolic equivalents

* ABC scale: Activities-specific Balance Confidence Scale

* PAM: The Patient Activation Measure

* CCQ: Clinical COPD Questionnaire

RESULT

- Based on the evidences it can be said that Singing for Lung Health (SLH) has role in Improving Quality of life in patient with COPD.
- SLH improve well-being, confidence of patient, sleep quality, minute ventilation, breath volume, breathing pattern, Hyperinflation, Inspiratory muscle strength and functional capacity in patient with COPD.
- SLH reduce Dyspnoea score, Anxiety, Depression and Health care utilization in patient with COPD.

DISCUSSION

Diaphragmatic breathing and extended control and coordinated expiration is a key element to support vocalization. During speech and singing, inspiration and expiration are both active in order to adjust lung volumes for phrase length and sound

volume because while singing breath duration and flow rates are controlled to support sound generation by the larynx. ^[14] Singers mostly control exhalation by contraction of the abdominal muscles including the rectus abdominus, internal and external obliques, transverse abdominus and the internal intercostals also work. As a passive breathing cycle, during a speech, inspiratory time is reduced and expiratory time is lengthened. Subglottic pressure is regulated more actively during speech and singing compared with unphonetic breathing and even more so while singing. ^[14]

Vocalisation required the activation of additional muscles, such as latissimus dorsi, which may be relevant in relation to respiratory muscle strength. forced expiratory volumes and vital capacities tend to have higher in singers than non-singers. Multiple factors can cause differences in lung function parameters between singers

and non-singers like lifestyle choices including smoking less and exposure to industrial dust or noxious particles.^[6] Singing can reduce hyperinflation and maintain lung capacity by slowing expiration which allows a greater degree of lung emptying.^[6] Improved breathing patterns and consequent oxygenation enhance oxygenation of peripheral muscle to improve functional capacity. Dysphonia can be improved or may be corrected by singing therapy.^[4] Cheerful, joy-full rhythm songs can make people excited and modulated brain cortex, endocrine system, nervous system, limbic system, and brainstem reticular formation which gives an uplifting experience, generation of a sense of positive mood, happiness, enjoyment and cure anxiety, depression and improve quality of life.^[4] Singing actions can benefit symptoms of COPD, some of the actions are expiration during singing requires controlled muscle activity. Regulation of glottis aperture and improved glottis efficiency. Alters abdominal and thoracic contribution to lung volume changes which can improve the length-tension ratio and forced-generation capacity on inspiration. Inspiratory muscle training can help to generate a higher capacity for inspiration over hyper inflated lungs. Enhance airway shear forces promote airway clearance. Training posture and balance optimises lung function. Singing is moderately intense physical activity and can increase the physical activity level of inactive COPD individuals.^[14]

CONCLUSION

From all the above mentioned articles which were reviewed from 2018 concluded that Singing for lung health (SLH) plays an important role in improving the lung function and quality of life in Chronic Obstructive Pulmonary Disease patients. SLH improve well-being, confidence of the patient, sleep quality, minute ventilation, breath volume, breathing pattern, Hyperinflation, Inspiratory muscle strength, and functional capacity in a patient with

COPD and reduce Dyspnoea score, Anxiety, Depression and Health care utilization in a patient with COPD. It can also be incorporated as a group rehabilitative program in the Physiotherapy field. There are very few recent evidences supporting this topic so more research should be conducted on it.

Declaration by Authors

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