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# Music Therapy for Pulmonary Rehabilitation in Chronic Obstructive Pulmonary Disease [COPD] Patients- An Interventional Trial

**R. Sobana<sup>1</sup>, Sumathy Sundar<sup>2</sup>, K. Jaiganesh<sup>3</sup>**

<sup>1</sup>Associate Professor of Physiology, AIMST University, Malaysia; <sup>2</sup>Director- Centre for Music Therapy Education & Research [CMTER], Sri Balaji Vidyapeeth, Pondicherry, India; <sup>3</sup>Professor & Head of Physiology, AIMST University, Malaysia.

## ABSTRACT

**Background:** Complementary therapies such as musical interventions are used as adjuncts in the rehabilitation of chronic illnesses.

**Methodology:** Patients who attended the Pulmonology OPD of a south Indian medical university and diagnosed as moderate asthmatics as per American Thoracic Society classification wererecruited. They were given music therapy in the form of vocal exercise and monotone OM chanting, by qualified music therapist 20 minutes a day for 21 days. The pulmonary functions- FVC (Forced Vital Capacity) and FEV1/FVC (Forced Expiratory Volume 1 second), dyspnoea level by Visual Dyspnoea Assessment Scale (VDAS) and stress level by Cohen's perceived stress scale were recorded during the recruitment and after completion of the entire music therapy sessions.

**Results:** Statistical analysis of pre and post music therapy data by paired t-test ( $p \leq 0.01$ ) showed there was a significant improvement of pulmonary functions, reduction of dyspnoea and perceived stress levels of our study population after undergoing music therapy.

**Conclusion:** Our study had shown that Music therapy can act as a holistic approach in pulmonary rehabilitation as there was a beneficial effect in the pulmonary functions, reduced breathlessness and stress level.

**Key Words:** Active music therapy, COPD, Pulmonary rehabilitation

## INTRODUCTION

Chronic Obstructive Pulmonary Diseases are a group of chronic inflammatory diseases leading to compromised lung functions and diminished gaseous exchange.<sup>1</sup> The mortality and morbidity of the disorder is alarming when we look at the evidence-based literature reports.

BOLD-Burden of Obstructive Lung Diseases reported global prevalence of COPD as 11.5% in general population by the survey in 29 countries among subjects aged 40 and above by spirometric evaluation.<sup>2</sup> WHO reported COPD as the second leading cause of DALYS Disability Adjusted Life Years –years of life lived with disability, next to Ischemic Heart

Diseases.<sup>3</sup> Due to compromised pulmonary functions apart from respiratory symptoms psychological comorbidities such as anxiety and depression are reported high in subjects with COPD.<sup>4</sup>

To evolve at the strategies for diagnosis, management and prevention of COPD, GOLD -“Global Initiative for Obstructive Lung Disease” GOLD was initiated. It was a network of professionals of multiple divisions collaborating together to improve quality of life of COPD patients.<sup>5</sup> GOLD guidelines recommend that, apart from improving the pulmonary functions the subjective component of COPD must also be taken care when the management is planned.<sup>6</sup> Complementary Alternate Medicine CAM plays a significant role as sup-

### Corresponding Author:

**Dr. R. Sobana MD**, Associate Professor of Physiology, AIMST University, Malaysia.

Email: [shobana234@gmail.com](mailto:shobana234@gmail.com)

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portive measures along with pharmacological interventions in the restoration of health and wellness. Yoga, mindfulness, music therapy are few modes of CAM widely practiced due to their potential benefits.<sup>7</sup> The effects of music therapy in various clinical settings were studied by researchers.<sup>8</sup> Listening to music was a common type of intervention in these studies. Research shows active musical intervention in form of participatory musical activity would yield better results.<sup>9</sup> This form of music therapy process has to be researched and validated so that it could be recommended as supportive care for pulmonary rehabilitation.

## OBJECTIVES

To deliver music therapy sessions to COPD patients in the form of vocal exercise and monotone OM chanting 20 minutes a day for 21 days. To observe and record the impact of the music therapy session on the pulmonary functions, dyspnoea and perceived stress levels.

## METHODOLOGY

It was an interventional trial conducted by the Centre for Music Therapy in collaboration with the Department of Pulmonology and Physiology of a south Indian medical university. The study was permitted by the Institutional Human Ethical Committee. (IHEC clearance: FACULTY /2015/12, ECR/415/ Inst /PY/2013)

Subjects fulfilling the inclusion criteria were recruited after explaining the music therapy intervention and informed consent was obtained for undergoing music therapy and utilising their clinical data for research.

**Inclusion criteria:** Patients aged 20 - 60 years of both sexes, diagnosed as moderate asthmatics per American Thoracic Society classification.<sup>10</sup> Asthmatics were chosen for music therapy since it was the most common type of COPD presented in the above mentioned research setting and as per the recommendation of the pulmonologist of the institution.

**Exclusion criteria:** Critically ill patients, patients with hard of hearing and those unwilling to experience musical intervention.

Baseline assessment of pulmonary functions, dysphonic index and perceived stress level were performed during recruitment. Pulmonary functions - FVC (Forced Vital Capacity) and FEV<sub>1</sub>/FVC (Ratio of Forced Expiratory Volume in the first second by the Forced Vital Capacity) were estimated by digital spirometer and subjects categorised as per the American Thoracic Society guidelines given below.

## American Thoracic Society classification

FEV <sub>1</sub> /FVC <80%	Mild COPD
FEV <sub>1</sub> /FVC <48%	Moderate COPD
FEV <sub>1</sub> /FVC <28%	Severe COPD

Dyspnoea level was assessed by Visual Dyspnoea Assessment Scale (VDAS). It is a numerical scale rated from 1 to 10, the severity of symptoms indicated by increase in the numerical rating. The validity was tested and documented by AG. Gift, in his study on the assessment of the level of shortness of breath.<sup>11</sup> The stress level was estimated by the Perceived Stress Scale, which is a self-rating questionnaire documented by Sheldon Cohen.<sup>12</sup> It consists of self-rated questions with 10 items rated from 0 to 4 relating to the stressors the person is exposed currently. This tool is tested and validated and is widely used by researchers to estimate stress levels.

**Music therapy intervention:** Patients were given a briefing on the method of musical process and the benefits of active participation. The music therapy session was delivered by a qualified music therapist 20 minutes once a day for three weeks. It was a vocal exercise in the form of “**monotone OM chanting**”. Subjects were guided by music therapist to chant rhythmically in the note “S” with the background of the Tampura which was used as the drone. **OM** is the primordial cosmic sound and a syllable used in the Vedas and Upanishads and many mantras to denote the self-knowledge, the Universe and a tool for meditation. The recital of this syllable in the monotone “S” induces deep abdominal breathing. After 21 days of sessions, all the study parameters were recorded. The pulmonary functions, psychometric parameters (dyspnoea level and perceived stress) recorded pre and post music sessions were analysed by paired t-test for significance.

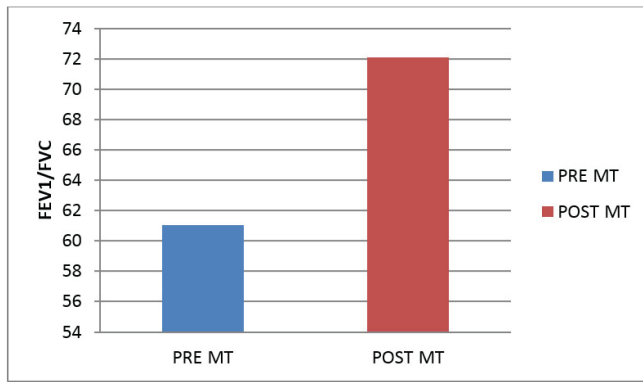
## RESULTS

Pulmonary functions show an increase of the mean FEV<sub>1</sub>/FVC from 61.03% to 72.11% ( $p \leq 0.001$ ) and mean Forced Vital Capacity from 3.89 litres to 5.03 litres ( $p \leq 0.021$ ), after interventions which were approximately 17% improvement in the lung functions.

**Table I: Pulmonary functions before and after musical intervention**

Pulmonary functions	Pre-Music therapy	Post-Music therapy	p-value
FEV <sub>1</sub> /FVC	61.03±6.16	72.11±6.33	0.001
FVC (litres)	3.89±4.32	5.03±4.87	0.021

FEV<sub>1</sub>/FVC: Forced Expiratory Volume 1 second (%)  
FVC: Forced Vital Capacity in litres



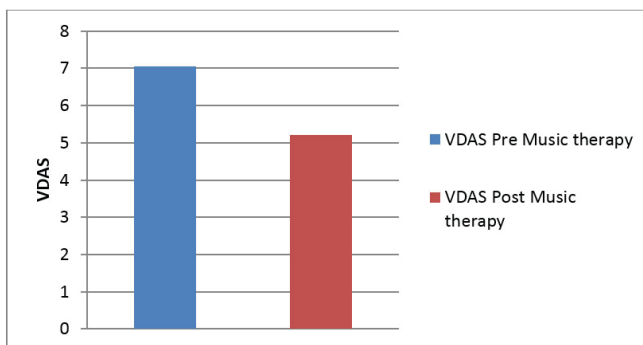
**Figure I:** FEV1/FVC before and after musical intervention

The dyspnoea level had reduced from 7.06 to 5.21 ( $p \leq 0.001$ ) which is a shift from severe to mild breathless level according to AG. GIFT's rating. According to the visual dyspnoea scale of 1-10, a score of less than 6 indicates mild breathlessness. The stress level (PSS) had come down from 36 to 23 indicative of reduced stress.

**Table II: Psychometric parameters before and after Music therapy**

Psychometric parameters	Pre-Music therapy	Post-Music therapy	p-value
VDAS	7.06± 2.11	5.2±3.47	0.00
PSS	36±4.2	23±7.2	0.01

VDAS -Visual Dyspnoea Assessment Scale, PSS-Perceived Stress Scale



**Figure II:** Dyspnoea scale before and after Music therapy

VDAS -Visual Dyspnoea Assessment Scale

## DISCUSSION

There was a significant improvement of pulmonary functions, reduction of dyspnoea and perceived stress levels of our study population after undergoing music therapy for the specified period of 21 days. This outcome could be explained by exploring the mechanisms by which music therapy acts. Evidence-based research documents state that music therapy

acts by both physiological and psychological modulations.<sup>13</sup>

The active musical activity of practicing OM chanting leads to the enhancement of deep breathing by physiological modulation. Deep breathing reduces the dead space thereby the minute ventilator volume was increased leading to enhanced vital capacity and gaseous exchange. Hence due to the physiological impact, the pulmonary functions of our subjects had improved.<sup>14</sup> Another mechanism is by the action on the neuroendocrine pathway leading to psychological modulations. The auditory pathway is the most densely interconnected tract, with collaterals to the nuclei of Hypothalamus, Limbic system, Amygdala and Hippocampus which are the seat of emotions.<sup>15</sup> By virtue of these neural networks, music acts on the Hypothalamo-Pituitary axis. There is a shift to parasympathetic dominance leading to a reduction of cortisol level which is responsible for stress. Sobana et al documented that music listening produces Heart Rate Variability of parasympathetic pattern.<sup>16</sup> Music activates the limbic system stimulating the reward-punishment center and promotes a feeling of wellbeing. There is evidence-based functional MRI report of increased vascularity to limbic and Para limbic structures upon music experiences.<sup>17</sup>

Most of the earlier researches were done on the influence of passive music listening in COPD patients. VP Singh et al studied the effect of a single session of hearing self-selected music versus progressive relaxation after acute exacerbation of pulmonary symptoms. There was a reduction in the anxiety score and dyspnoea level of the music group. Report on the beneficial effect of as little as a single musical session showed the magnitude of musical influence.<sup>18</sup> Another researcher MacBride observed reduction in the dyspnoea whereas the level of anxiety was unaltered by music listening.<sup>19</sup> Brooke C and Sidani document a contrary result of unaltered anxiety and dyspnoea level after musical exposure.<sup>20</sup> Panigrahi et al performed a systematic review on the benefits of musical intervention on COPD patients. Improvement in Quality of life, anxiety and dyspnoea were reported by him.<sup>21</sup> Wai SF reported engagement in musical activity reduced anxiety and depression in elderly assessed by the HAD-Hospital Anxiety Depression Scale.<sup>22</sup>

Compared to the earlier studies, our intervention was an active involvement, hence both improvements in pulmonary functions and subjective impact were produced. We can infer that subjective impact of diminished dyspnoea and stress levels were possible by both improved pulmonary functions and the anxiolytic impact of music.

## CONCLUSION

Hence we could conclude that, even though music listening helps pulmonary rehabilitation, active involvement is more beneficial. Our study had shown that Music therapy can act

as a holistic approach in pulmonary rehabilitation as there was a beneficial effect in the pulmonary functions, reduced breathlessness and stress level. It has to be taken up as an adjunct therapy to pharmacological drugs and patients have to be motivated to practice for a long term to obtain a relatively permanent change.

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