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Clinical trial paper

AIR: Advances in Respiration – Music therapy in the treatment of chronic pulmonary disease

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ABSTRACT

The aim of this randomized control study is to examine the effect of a multimodal psycho-music therapy intervention on respiratory symptoms, psychological well-being and quality of life of patients with Chronic Obstructive Pulmonary Disease and other lung diseases as adjunct to Pulmonary Rehabilitation with a design of music therapy plus PR compared to Pulmonary Rehabilitation alone. Music therapy group treatment including music visualization, wind playing and singing was provided weekly. This was compared with standard care treatment. Adults ages 48 to 88 (mean 70.1) with moderate to severe GOLD stage II-IV lung disease as well as other diseases processes that lead to chronic airflow limitations were included ($n = 98$). Participants in both conditions were followed from baseline enrollment to six weeks post control/treatment. Outcome measures included the Beck Depression Inventory Scale 2nd edition-Fast Screen (BDI-FS), Chronic Respiratory Questionnaire Self-Reported (CRQ-SR), and Dyspnea Visual Analog Scale (VAS). Results showed improvement in symptoms of depression (LS mean −0.2) in the music therapy group with statistical divergence between groups ($p = 0.007$). The CRQ-SR demonstrated improvement in dyspnea ($p = 0.01$ LS mean 0.5) and mastery ($p = 0.06$ LS mean 0.5) in the music therapy group and fatigue ($p = 0.01$ LS mean 0.3). VAS demonstrated highly significant effect in the music therapy group between weeks 5 and 6 ($p < 0.001$). The findings of this study suggest that music therapy combined with standard PR may prove to be an effective modality in the management of pulmonary disease.

1. Introduction

Pulmonary Rehabilitation has emerged over the last decade as an essential component to an integrated approach in the management of chronic respiratory diseases. The treatment of COPD has expanded to include a variety of rehabilitative practices. In this study, we endeavored to evaluate the impact of a comprehensive music therapy program, inclusive of live wind playing, music visualization, and therapeutic singing, on chronic lung diseases including COPD. This clinical trial integrates the disciplines of Pulmonary Rehabilitation and Music Therapy. The development of this study was founded on the implementation of the Advances in Respiration program, integrating The Alice Lawrence Center for Health and Rehabilitation and The Louis Armstrong Center for Music and Medicine, both at Mount Sinai Beth Israel, where pulmonary rehabilitation and music therapy treatments formulated the basis of clinical trials whose outcomes are reported in this study.

1.1. Background

The effectiveness of music as a non-pharmacological and non-invasive intervention to relieve breathlessness is well recognized [1]. Music interventions are not uncommon components of research designs that host integrative strategies set up to ameliorate some of the physical and psycho-emotional consequences of pulmonary diseases. In classifying the types of interventions included in this recent Cochrane review, there appears to be a focus primarily on three methods of music study interventions: music listening, music as a healthy prompt for exercise, and singing as a way to engage the lungs and gain awareness of voluntary breathing prompts. However, music has most usually been considered an independent variable as most clinical trials have focused on the effect of music in a particular outcome, such as physical endurance,

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pulmonary function, depression and anxiety, and/or health related quality of life, rather than recognizing music's integrative capacity [1]. A recent literature review included three music therapy interventions where their influence on medical outcomes was highlighted. Singing and diaphragmatic breathing, induced-relaxation during music listening, and wind playing, were investigated and shown to be novel strategies in the management of pulmonary diseases [2].

The use of musical wind instruments in the treatment of pulmonary disease is an area that our clinical team has implemented with success for over a decade. We are convinced that music therapy wind play interventions deserve special consideration for their replication of traditional standardized treatments such as Pursed Lips Breathing (PLB) techniques. The American Thoracic Society guidelines describe the technique of PLB as "involving a nasal inhalation [3], followed by expiratory blowing against partially closed lips, avoiding forceful exhalation." Easy-to-play wind instruments including harmonica, melodica, recorder, and slide-whistle provide an incentive to voluntarily and creatively address diaphragmatic breathing and body posture, which can increase expiratory airways pressure. Several investigators have studied the altered breathing pattern and the airflow and air pressure within the respiratory apparatus during wind instrument playing [4–8]. Nevertheless, there is still a dearth of evidence-based outcomes from studying the effect of wind playing on respiratory muscle strength, physical endurance, and breathing technique strategies that music therapy provides. A clinical practice that integrates mind-body connection, psychotherapy, and resilience may benefit patients suffering with the sporadic, debilitating symptoms of pulmonary diseases. The effect of playing wind instruments on lung function and respiratory systems was previously investigated by measuring expiratory flow-volumes in normal wind instrument players ($n = 99$). Results showed significantly higher lung function parameters in the wind musicians and yet wind instrument players demonstrated a significantly higher prevalence of mild respiratory infection than their control musician group [9].

In a randomized controlled study, harmonica playing was assessed for its influence on shortness of breath, Health-Related Quality of Life, functional capacity, and functional exercise capacity among COPD patients ($n = 28$) enrolled in PR. The harmonica treatment group receiving one-on-one harmonica instruction by registered nurses, respiratory therapists, or exercise physiologists included techniques of understanding proper inhalation and exhalation through harmonica play practice of 3 or 4 simple melodies. The results showed no statistically significant differences between groups in all outcome measures. This study, among most others sited above, lacked inclusion of board certified music therapists who have formed the clinical sessions with an emphasis on psychotherapeutic variables blended with medical knowledge [10].

To our knowledge, our study is the first of its kind, combining a multi-modal intervention (live music visualization, wind-playing, and therapeutic singing) as adjunct of standard PR, with the aim of evaluating the impact of music therapy on depression, perceived dyspnea, and Health-related Quality of Life (HRQL) in patients with moderate to advanced lung disease.

2. Method

2.1. Research methodology

The primary goals of this study are to evaluate the impact of music therapy interventions on respiratory symptoms, psychological well-being, and quality of life in patients receiving both PR and MT as compared to a control group receiving standard PR alone. The study began in 2008 and finished in 2013. It was approved by the Hospital Institutional Review Board Committee (IRB#081-08) and registered as a clinical trial (NCT02146235). The cohort included males and females aged between 48 and 88 years, objectively diagnosed with GOLD stages II/III/IV [11] as well as other chronic disabling respiratory diseases. Inclusion criteria were defined as being admitted in PR as well as the ability to attend music therapy sessions once a week for 6 weekly sessions. The patients were required to be medically stable simultaneously allowing them to participate in PR. Standard pulmonary rehabilitative medical care consisting in 24 weeks that included a careful patient evaluation, education, instruction in respiratory techniques, and exercise training was used as the control to music therapy plus PR. Patient group allocation was generated using a computer randomization protocol. Each music therapy session included live music visualizations, wind instrument playing inclusive of clinical improvisation, and singing, which provided direct methods of working with the breath control and were undertaken to study the effects on their perceived dyspnea, depression, and quality of life. We define *visualization* as the process by which patients focus on their respiration to achieve a state of calm allowing them to inhale and exhale fully to the tempo and rhythms of live music, entrained to their tempo and depth of breathing. Patients were encouraged to choose between easy-to-play wind instruments e.g. recorder, slide whistle, harmonica, or melodica and instructed on their use. The weekly music therapy sessions lasted forty-five minutes, for a period of six weeks, in groups of six participants or less. CRQ and BDI-FS were administered before and after the 6-week study period on both treatment and control group. At the beginning and end of each session the patients were asked to score the intensity of breathlessness' perception by drawing a circle on different pictures of lungs that represented the extent of dyspnea. These recorded measures were collected in order to evaluate the subjective effect of the intervention on the patients' perception of dyspnea.

Eight certified music therapists throughout the span of the study's duration provided active music-psychotherapeutic experiences included in the music therapy interventions that supported and encouraged optimal breathing, fostered self-expression, and increased opportunities for coping with the challenges of chronic respiratory disease.

2.2. Outcome measures

Primary outcomes were depressive symptoms and HRQL. Depressive symptoms were evaluated using the Beck Depression Inventory 2nd Edition-Fast Screen, measuring signs and symptoms such as sadness, pessimism, past failure, anhedonia, self-dislike, self-criticalness, and suicidal thoughts or ideation [12]. Each question is answered on a scale of 0–3 (0 being little or none, and 3 representing a high level of the characteristic in question). Lower scores indicate improvement in depression symptoms. HRQL was measured by the Chronic Respiratory Questionnaire Self-Reported [13,14]. It is divided into four dimensions of dyspnea, fatigue, emotional function and mastery, with a 7-point Likert scale response for each question. Clinical consequences of the results were evaluated following the Minimum clinical important difference [15]. An average improvement of 0.5 per dimension relates to positive feelings. Higher scores indicate better HRQL. A Dyspnea Visual Analog Scale measured perceived dyspnea in participants before and after the music therapy sessions. VAS are widely used for the measurement of the symptoms of dyspnea and their validity as been established in several studies [16].