

Evidence Based Chest Physiotherapy for Cystic Fibrosis

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ARTICLE INFO

Received: 📅 February 14, 2019

Published: 📅 February 27, 2019

Citation: Mohammad Habibur Rahman. Evidence Based Chest Physiotherapy for Cystic Fibrosis. Biomed J Sci & Tech Res 15(2)-2019. BJSTR. MS.ID.002673.

ABSTRACT

Cystic fibrosis (CF) is a genetically predisposed disease causing difficulties in clearance of bronchial sections. In addition to medicine different physiotherapy treatment techniques for instance postural drainage, percussion, chest shaking, huffing and coughing helps to clear bronchial sections and lessen the work of breathing. Absolute indication and dose based chest physiotherapy is mandatory and evidence based physiotherapy practice is essential for livelihood of a CF patient.

Abbreviations: CF: Cystic Fibrosis; PEP: Positive Expiratory Pressure; HPEP: High pressure PEP; P&PD: Percussion and Postural Drainage; OPEP: Oscillatory PEP; HFCC: High Frequency Chest Compressions; AD: Autogenic Drainage.

Introduction

Pulmonary diseases regarded as one of the main sources of limitation in daily livelihood. These limitations are highly influenced by difficulties to clear bronchial secretions, symptoms of breathlessness and decrease exercise tolerance [1]. Chest disease like cystic fibrosis (CF) exhibited similar features described as earlier. However, CF is associated with morbidity and an infrequent threat of life [2]. CF is a genetic disease characterized by dehydration of airway surface liquid and causing difficulties of mucociliary clearance. As a result patients experience chronic pulmonary infections as well as inflammation.

Methods

Sixty experimental and quasi experimental studies were found using PUBMED, GOOGLE SCHOLAR, CINAHL and HINARI in which eight were cross over studies focusing on chest physiotherapy techniques. Among those one investigated the effects of autogenic drainage, six focused on conventional chest physiotherapy, three applied oscillating positive expiratory pressure, seven investigated the effects of positive expiratory pressure and another one examined the effects of high pressure positive expiratory pressure on respiratory functions.

Among the eight crosses over studies, six experiments focused on single treatment approaches in which four experiments comprising of 28 participants was found a huge amount of expelled secretions after application of chest physiotherapy when compared to no treatment option. One experiment was conducted on 18 participants and found similarities of sputum weight when compared to control group. However, another one study found that chest physiotherapy for CF was solely based on airway clearance techniques and these were Positive Expiratory Pressure (PEP) mask therapy, High pressure PEP (HPEP) mask therapy, ACBT, autogenic drainage, exercise and oscillating devices. Four reviews addressed Percussion and Postural Drainage (P&PD), two reviews addressed Positive Expiratory Pressure (PEP) and two addressed physical training. Among the nineteen additional controlled trials, five studies assessed P&PD, two PEP, four Oscillatory PEP (OPEP), six assessed High Frequency Chest Compressions (HFCC), three physical or exercise training, three ACBT and no additional studies were identified addressing high pressure PEP (HPEP) or Autogenic Drainage (AD).

Discussion: (Table: 1) [3-11]

Table 1.

Airway Clearance Technique	Study Design	Interventions	Applicable Age Range
Conventional chest physiotherapy [3,4]	Systematic review	Postural drainage, components of the ACBT, huffing, percussion, shaking, and vibrations	≥ 18 months
	Systematic review	Postural drainage, percussion, chest shaking, huffing and directed coughing. It did not include the use of exercise, FET, PEP or other mechanical devices.	≥ 2 years
ACBT [5,6]	Systematic review	Breathing control with thoracic expansion and the forced expiration technique (FET). It may also include postural drainage and chest clapping.	≥ 4 years
	RCT	ACBT comprising breathing control, thoracic expansion exercises and the FET, frequently combined with gravity assisted positioning.	≥ 4 years
Autogenic Drainage [7]	RCT	Low lung volume to unstuck mucus in peripheral airways, mid-lung volume to collect mucus in middle airways and high lung volumes to expel mucus from central airways.	≥ 8 years
Airway Oscillating Devices (AOD) [8]	RCT	Delivered oscillatory positive pressure during expiration by pipe shaped hand-held device.	≥ 4 years
Percussion and Postural Drainage [9]	RCT	Postural drainage: Different drainage position based on affected lobe versus PEP-mask: Delivering positive pressure	All ages
Positive Expiratory Pressure (PEP) [10]	RCT	High-Frequency Chest Compression (HFCC): oscillation with frequency between 5 and 15 HZ by compressive jacket generates airways vibrations, Positive Expiratory Pressure: Delivering a positive pressure between 10-20 cm H ₂ O via a facemask or mouthpiece.	≥ 4 years
Exercise [11]	RCT	Aerobic exercise: Aerobic exercise program (walking and running) three days a week for three weeks at 70% of the maximum heart rate showed increase in respiratory muscle endurance and improvement in aerobic performance.	≥ 8 years

Conclusion

CF is a disabling condition causing impairments in lung function. The huge production of secretions and symptoms of breathlessness is an emergency. This short communication found that evidence based chest physiotherapy techniques helped to clear secretion and provided eases in breathing. Thus a person with CF can maintain better quality of life through application of evidence based and appropriately indicated chest physiotherapy

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ISSN: 2574-1241

DOI: 10.26717/BJSTR.2019.15.002673

Mohammad Habibur Rahman. Biomed J Sci & Tech Res



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