



The immediate effect of musculoskeletal physiotherapy techniques and massage on pain and ease of breathing in adults with cystic fibrosis

Annemarie Lee ^{a,*},¹, Melissa Holdsworth ^a, Anne Holland ^{a,b}, Brenda Button ^a

^a *The Alfred Hospital, Australia*

^b *La Trobe University, Victoria, 3086, Australia*

Received 12 March 2008; received in revised form 28 May 2008; accepted 14 July 2008

Available online 20 August 2008

Abstract

The optimal treatment approach to musculoskeletal pain in cystic fibrosis remains unclear. This study aimed to examine the effect of a combination of musculoskeletal physiotherapy techniques and massage therapy on musculoskeletal pain and ease of breathing. A single treatment session was associated with reduction in pain and improvement in ease of breathing in adults with cystic fibrosis.

Crown Copyright © 2008 Published by Elsevier B.V. on behalf of European Cystic Fibrosis Society. All rights reserved.

Keywords: Musculoskeletal pain; Respiratory symptoms; Physiotherapy techniques; Massage therapy

1. Introduction

The increased longevity of patients with cystic fibrosis (CF) is accompanied by a rising prevalence of musculoskeletal complications. Up to 94% of adults with CF report back or spinal pain while the incidence of chest pain varies from 32 to 64% [1–6]. These musculoskeletal manifestations have been partially attributed to an increased rate of thoracic kyphosis and vertebral compression fractures in CF, both of which contribute to the development of spinal and chest wall stiffness and soft tissue contractures [1,7].

The treatment options for musculoskeletal pain in CF have been afforded limited attention. Stretching regimes together with thoracic mobilization techniques have been advocated for treatment of thoracic kyphosis [1,8], with associated with improve-

ment in the work of breathing [9]. A combined approach of neuromuscular retraining and joint mobilization resulted in improved thoracic spine, chest wall and scapula mobility and postural alignment in a child with CF [10], while massage therapy in adults with CF has been associated with reduction in pain and muscle tension [11]. Despite this preliminary work, the optimal treatment approach to alleviate musculoskeletal pain and improve ease of breathing remains unclear [12]. The aim of this study was to assess the impact of a single musculoskeletal treatment session using massage/soft tissue therapy and mobilization techniques on pain and ease of breathing in adults with CF.

2. Methods

Patients registered with The Alfred Adult CF Service who reported musculoskeletal pain to their primary physiotherapist whilst admitted with an acute exacerbation or when clinically stable and who subsequently accessed the musculoskeletal and massage physiotherapy service between January and September 2006 were enrolled in this study. Institutional ethics approval was obtained and each patient provided informed consent prior to participation.

Each patient underwent a musculoskeletal/postural assessment to determine the primary region of musculoskeletal pain and identify contributing factors. Regional locations of pain were marked on the anterior and posterior view of a validated

* Corresponding author. Department of Physiotherapy, The Alfred, Commercial Road, Melbourne 3004, Australia. Tel.: +61 3 9076 3450; fax: +61 3 9076 2702.

E-mail address: Annemarie.Lee@alfred.org.au (A. Lee).

¹ Annemarie Lee presented a version of this paper at the 30th European Cystic Fibrosis Conference, Belek, Turkey in June 2007, at the 10th National Cardiorespiratory Australia Group conference of the Australian Physiotherapy Association, Cairns, Australia in October 2007 and the 21st North American Cystic Fibrosis conference, Anaheim, California, United States of America in October 2007.

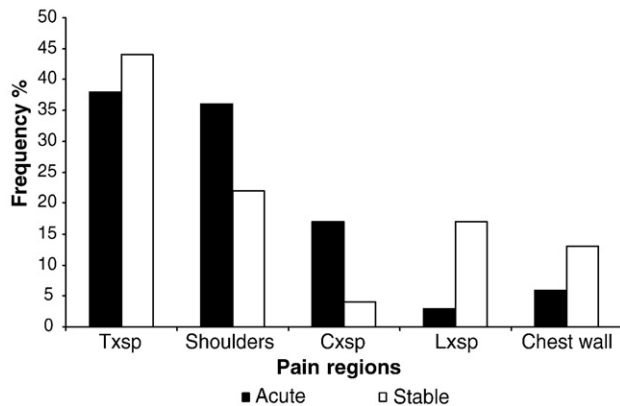


Fig. 1. Primary regions of pain based on clinical status. TxSp=Thoracic spine, CxSp=Cervical spine; LxSp=Lumbar spine.

body outline, with a score of 1 recorded for pain presence and a score of 0 for pain absence [13]. Following assessment, a single individualized treatment session of up to one hour duration was completed. A combination of spinal joint and intercostal mobilization was used, together with soft tissue therapy and remedial massage for each patient. Ratings of musculoskeletal pain and ease of breathing (EOB) were measured on a visual analogue scale prior to and at the conclusion of treatment. Statistical analyses were performed using SPSS version 15.0. Univariate comparisons were made using Student's *t*-test. Alpha was set at 0.05.

3. Results

A total of 105 adults with CF, with a mean (SD) age of 30.5 (9.4) years and an FEV₁ of 48.1 (18.6) % predicted who accessed the musculoskeletal and massage physiotherapy service during the study period were included. Approximately 40% of patients had previously accessed this service but none had received treatment in the 3 months prior to participating in this study. Of those included, 70 (66%) participated whilst admitted with an acute exacerbation while 35 (33%) were clinically stable. Only 2 patients had a past history of rib fractures, which occurred greater than 12 months prior to the study, and 4 patients

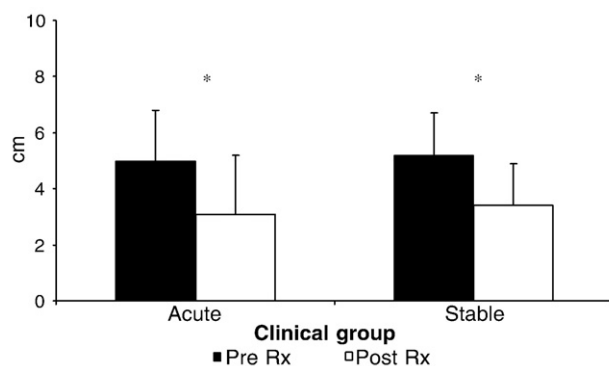


Fig. 2. Pain ratings before and after treatment. Results are mean and standard deviation. **p* value pre and post treatment <0.05.

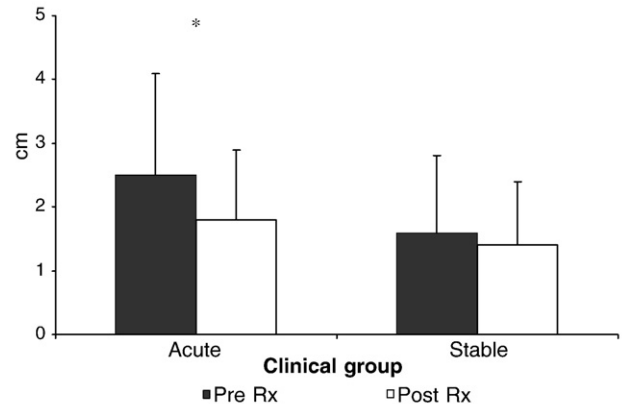


Fig. 3. Ease of breathing ratings before and after treatment. Results are mean and standard deviation. **p* value pre and post treatment <0.05.

had CF arthropathy which was confined to the peripheral joints and was not exacerbated at the time of the study.

The majority of patients (90%) reported chronic pain which had been experienced for at least 3 months prior to reporting it to their primary physiotherapist. The remaining 10% reported acute pain of less than 3 days duration. All patients were reviewed by the service within three days of reporting pain. The most common regions of chronic or acute pain reported are outlined in Fig. 1. Overall, there was a significant reduction in pain following treatment (mean difference of 1.8 cm, 95% CI 1.5–2.1 cm, $p < 0.001$), with both subgroups reporting less pain after treatment (Fig. 2). Overall, the rating of EOB improved significantly following treatment (mean difference 0.5 cm, 95% CI 0.4–0.7 cm, $p < 0.001$), with significant improvements in the acute group, but not the clinically stable group (Fig. 3).

4. Discussion

This study is the first to determine the immediate effect of a combined treatment approach on clinical symptoms in a large group of adults with CF. Musculoskeletal pain was predominantly confined to the spinal region, shoulders and chest wall. Immediate alleviation of pain and improvement in ease of breathing was achieved using a combined approach of manual mobilization techniques and massage therapy.

These treatment effects are comparable to the decrease in acute or chronic low back pain following therapeutic massage [14,15]. Similarly, mobilization techniques, remedial and relaxation massage has been associated with reduced pain and improvement in well-being in adults with an acute exacerbation of CF [11]. While this current study only demonstrated short term benefit, the reduction in pain and improvement in ease of breathing in all patients irrespective of clinical status suggests that this approach is worthy of further investigation. The improvement in ease of breathing in patients who were acutely unwell implies that the musculoskeletal limitations found during assessment not only contribute to the ease of breathing but can be addressed by this form of treatment. The lack of improvement in respiratory symptoms for patients who were clinically stable

may be accounted for by the lower ratings of EOB prior to treatment.

Up to 26% of adults with CF do not access treatment for musculoskeletal pain while a small proportion have sought therapeutic relief from pharmacological and non-pharmacological remedies including massage, relaxation and rest [4,5]. While this may suggest a lack of perceived need for treatment, it may also reflect the current burden of therapy regimens existing for patients and subsequent reluctance to include additional treatment. In view of the intensive daily physiotherapy required for all patients, a hands-on approach to musculoskeletal pain may be critical to achieving clinical improvement as opposed to exercise prescription only. Although the individual contribution of each component of treatment cannot be distinguished, this approach is reflective of a typical clinical strategy of management, using a combination of treatments.

While this alleviation in symptoms following treatment is promising, the clinical significance of this improvement in terms of ease and efficacy with which airway clearance and exercise therapy can be completed remains to be established. This type of therapeutic approach requires evaluation over a longer duration with greater frequency of intervention to determine the extent of this improvement and the duration over which it may be sustained. The lack of a control group in this study allows the potential for a placebo effect of treatment. The absence of an independent assessor measuring pain and EOB ratings may have resulted in an over-interpretation of the benefit of this treatment.

5. Conclusions

As the longevity of patients with CF increases, the prevalence of musculoskeletal pain is likely to continue to rise. The clinical impact of this pain is becoming more apparent but the optimal management is currently unclear. The potential role of physiotherapy techniques and massage therapy in alleviating this pain has been suggested in this group of adult patients with CF but future research in the form of a randomized controlled trial with a blinded assessor is necessary to ascertain the longer term clinical benefits.

Acknowledgements

The authors would like to thank all the patients who participated in the study and the Simon Rhoden foundation for

providing the funding for the musculoskeletal physiotherapy and massage service.

References

- [1] Rose J, Gamble J, Schultz A, Lewinston N. Back pain and spinal deformity in cystic fibrosis. *Am J Dis Child* 1987;141:1313–6.
- [2] Ravilly S, Robinson W, Suresh S, Wohl M, Berde C. Chronic pain in cystic fibrosis. *Pediatrics* 1996;98(4):741–7.
- [3] Tattersall R, El Saffi T, Govin B, Ledson M, Walshaw M. Relationship between posture and symptoms in adult patients with cystic fibrosis. *J Cyst Fibros* 2002;1:187.
- [4] Festini F, Ballarin S, Codamo T, Doro R, Laganas C. Prevalence of pain in adults with cystic fibrosis. *J Cyst Fibros* 2004;3:51–7.
- [5] Koh J, Harrison D, Palermo T, Turner H, McGraw T. Assessment of acute and chronic pain symptoms in children with cystic fibrosis. *Pediatr Pulmonol* 2005;40:330–5.
- [6] Palermo T, Harrison D, Koh J. Effect of disease-related pain on the health-related quality of life of children and adolescents with cystic fibrosis. *Clin J Pain* 2006;22(6):532–7.
- [7] Aris R, Renner J, Winders A. Increased rate of fractures and severe kyphosis: sequelae of living into adulthood with cystic fibrosis. *Ann Intern Med* 1998;128:186–93.
- [8] Denton J, Tietjen R, Garerlan P. Thoracic kyphosis in cystic fibrosis. *Clin Orthop Relat Res* 1981;135:71–4.
- [9] Vibek P. Chest mobilisations and respiratory function. In: Pryor J, editor. *Respiratory Care*. Edinburgh: Churchill Livingstone; 1991.
- [10] Massery M. Musculoskeletal and neuromuscular interventions: a physical approach to cystic fibrosis. *J R Soc Med* 2005;98(Suppl 45):55–66.
- [11] McQueen K, Button B, Heathcote C. Massage and musculoskeletal physiotherapy service for CF adults: effects on chest mobility, posture, muscle tension, pain, ease of breathing and well-being. *Pediatr Pulmonol* 2003; Suppl 25(266):240.
- [12] Dodd M, Prasad A. Physiotherapy management of cystic fibrosis. *Chron Respir Dis* 2005;2:139–49.
- [13] Margolis R, Tait R, Krause S. A rating system for use with patient pain drawings. *Pain* 1986;24:57–65.
- [14] Preyde M. Effectiveness of massage therapy for sub acute low-back pain: a randomised controlled trial. *Can Med Assoc J* 2000;162:1815–20.
- [15] Hernandez-Reif M, Field T, Krasnegor J, Theakston H. Lower back pain is reduced and range of motion increased after massage therapy. *Int J Neurosci* 2001;106:131–45.