CLINICAL OUTCOMES AND MECHANISMS OF ACTION FOLLOWING PILATES EXERCISE OR STATIONARY CYCLING FOR PATIENTS WITH CHRONIC NON-SPECIFIC LOW BACK PAIN

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Introduction

It is thought that an exercise program for patients with chronic non-specific low back pain (LBP) must be targeted towards biological deficits. This has led to the design of specific trunk exercise programs to target deficient strength, endurance, and motor control in LBP patients. Alternatively, many reason that owing to the importance of psychological factors such as pain catastrophizing and fear-avoidance beliefs (FAB), any form of moderate-to-vigorous physical activity is likely to be effective for patients with LBP. No clinical trial has compared outcomes, or examined the key mechanisms of action, between a program specific targeted to the trunk muscles (e.g. Pilates exercise) and an exercise program that has no specific trunk focus (e.g stationary cycling).

Purpose

To examine changes in pain and disability following 8-weeks of Pilates or stationary cycling, and to investigate whether motor control or psychological adaptation explains any similar, or differential outcomes.

Methods

This was a single-blinded randomized controlled trial of 8-weeks group-based, supervised Pilates or stationary cycling with a 6-month follow-up. 64 patients with chronic non-specific LBP volunteered to participate. Primary clinical outcomes were pain (VAS scale) and disability (Oswestry disability index). Catastrophizing and FAB were examined using self-report questionnaires. The motor control mechanism examined was the onset of trunk muscles during a rapid limb movement using surface electromyography. Intention-to-treat principles were followed in the analyses. Effect sizes and confidence intervals were calculated for all results. Per-protocol analysis was conducted on adherent participants (2/3 attendance). Clinically meaningful improvements (CMI) were based on greater than 30% reductions in VAS or Oswestry scores.

Results

Greater reductions in pain and disability were observed at 8-weeks following Pilates ($p<0.05$). FAB were reduced following Pilates ($p<0.05$), but were not different from cycling. Similar reductions in catastrophizing were observed for both groups ($p<0.01$). Per-protocol analysis revealed numbers of participants in the training groups reporting a CMI were the same. No between-group differences were observed for self-report measures at 6-months. Trunk muscle onsets were only analyzed for adherent participants. Similar between-group changes were observed at 8-weeks.

Relevance

These results should be considered within the context of a clinician recommending a type of exercise for a LBP patient.

Conclusions

Inferential statistics suggest greater improvements in pain and disability at 8-weeks following Pilates, although patient biases may have exaggerated the magnitude of change. If a minimum level of adherence is achieved, it is likely that similar numbers of patients will experience clinically meaningful improvements.

Similar between-group changes in catastrophizing and trunk muscle onsets would suggest these are the likely 'active ingredients' that explain similar clinical outcomes.

Implications
If a LBP patient adheres to the exercise program, it is likely that either Pilates or stationary cycling will achieve similar clinical improvements. This study did not address issues of patient sub-grouping or individual responsiveness.

Keywords
Exercise, Pilates, stationary cycling, pain, disability, fear-avoidance, catastrophizing, feedforward activation, electromyography, motor control