Journal of Science and Medicine in Sport xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

Journal of Science and Medicine in Sport

journal homepage: www.elsevier.com/locate/jsams

Original research

Enhanced Exercise Therapy in Parkinson's disease: A comparative effectiveness trial

Angela L. Ridgel[a,*], Benjamin L. Walter[b,c], Curtis Tatsuoka[b,d], Ellen M. Walter[b,c], Kari Colón-Zimmermann[d], Elisabeth Welter[d], Martha Sajatovic[b,d]

[a] Department of Exercise Physiology, Kent State University, USA
[b] Case Western Reserve University School of Medicine, USA
[c] Movement Disorder Center, University Hospitals, USA
[d] Neurological and Behavioral Outcomes Center, University Hospitals Case Medical Center, USA

ARTICLE INFO

Article history:
Received 26 July 2014
Received in revised form
27 December 2014
Accepted 15 January 2015
Available online xxx

Keywords:
Movement disorders
Psychoeducation
Physical activity
Motivation
Outcome assessment (health care)
Physical therapy modalities

ABSTRACT

Objectives: Exercise can improve motor function in people with Parkinson's disease but depression reduces the motivation to participate in regular exercise. The aim of this study was to develop a novel Enhanced Exercise Therapy program that uses manual-driven guided exercise and peer-facilitated psychoeducation for individuals with Parkinson's disease and depression.
Design: 24 week randomized controlled design.
Methods: Thirty individuals were randomized to Enhanced Exercise Therapy or self-guided therapy, and evaluated at baseline, 12-weeks and at 24-weeks. Enhanced Exercise Therapy included group exercise and group psychoeducation for 12 weeks. Between 13 and 24 weeks, individuals had access to the fitness facility but group sessions were not held. Self-guided therapy included written guidelines for a self-paced exercise program and psychoeducation. Primary outcome measures included the number of exercise sessions and International Physical Activity Questionnaire score. Secondary measures included resting heart rate, supine blood pressure, estimated VO_2max and incidence of orthostatic hypotension.
Results: Twenty four individuals completed the study (80% retention) and both groups attended similar number of exercise sessions. There were no significant changes in cardiovascular fitness measures but there was a significant increase in the amount of physical activity in the Enhanced Exercise Therapy group and a decrease in the self-guided therapy group during the post-intervention period.
Conclusions: Enhanced Exercise Therapy appears to promote engagement in an exercise program and more physical activity, even after group sessions were concluded in individuals with Parkinson's disease and depression.

1. Introduction

Parkinson's disease (PD) is a progressive neurological disease that leads to significant motor deficits (tremor, bradykinesia, rigidity, gait impairments), physical inactivity, and apathy.[1] In addition, depression can promote loss of initiative and can decrease self-esteem and self-efficacy.[2] The incidence of depression in PD (PD-Dep) is estimated to be 30–50%.[3] Regular aerobic exercise improves motor function in PD[4,5] and the effects of exercise on depression are generally positive.[6,7] However, a significant barrier to physical activity is active engagement. Active engagement can be fostered through the integration of peers with PD and caregivers into an exercise program.[8,9] Development of community-based programs, which integrate peer advocates, are likely to empower individuals with PD to overcome physical and emotional barriers[10] to physical activity.[8,11,12]

This Enhanced Exercise Therapy (EXCEED) intervention combines psychoeducation with both peer support and exercise to take advantage of behavioral approaches, the positive effects of exercise on motor function and cognition, and the tremendous potential of individual empowerment to manage illness. Psychoeducation integrates psychotherapeutic and educational interventions to improve self-management and coping skills.[13] Combining psychoeducation with both peer support and exercise may enhance the value of either approach independently.[8] The peer support component was adapted from previous work, using peer educators to assist with health management in serious mental illness and diabetes.[14] The exercise component of EXCEED is unique because it focuses on

* Corresponding author.
E-mail address: aridgel@kent.edu (A.L. Ridgel).

http://dx.doi.org/10.1016/j.jsams.2015.01.005
1440-2440/

interval high-cadence cycling and resistance training using equipment found in the typical fitness center. Previous studies have shown that high-cadence cycling can improve motor and cognitive function in PD.[15–17]

This study examined the impact of a structured exercise program paired with peer support and targeted psychoeducation on mood, mobility, fitness, physical activity and cognition in individuals with PD-Dep. The effects on mood and cognition will be reported in a separate paper. The goal of this paper is to demonstrate the effectiveness of this program by addressing three major questions: (1) Are individuals adherent with the program?, (2) Do fitness parameters change with this program? and (3) Does physical activity behavior change after the program is completed?

2. Methods

Thirty individuals with PD-Dep were recruited from the neurology practices and community support groups. All participants had (1) a diagnosis of idiopathic PD by UK Brain Bank Criteria, Hoehn and Yahr stage I–III; (2) a diagnosis of unipolar major depression and minimum Montgomery–Åsberg Depression Rating Scale score of ≥14; (3) the ability to walk independently; (4) no changes to current PD medication within the last 2 weeks and within the last 4 weeks for antidepressants. Individuals with MMSE score of <24, unstable cardiovascular disease, high fall risk, or who suffered from uncontrolled chronic conditions that would risk safety were excluded. Medical clearance for exercise was obtained from the primary physician. The study was approved by the Case Western Reserve University IRB and all participants provided written informed consent.

Individuals were randomized (1:1 ratio) into: (1) EXCEED (Enhanced EXerCisEthErapy) or (2) Self-guided exercise therapy (SGE). Study staff blinded to the group assignment performed the outcome measures. The EXCEED program included three components: Psychoeducation, peer education/support and manualized group exercise. All group meeting and exercise sessions were conducted at a local fitness facility. Study participants were asked to attend three exercise sessions (Monday/Wednesday/Friday) and one psychoeducational session (Friday) per week for 12 weeks and then were given a "continuing exercise manual" for the next 12 weeks. The SGE group was given a written manual of the informational materials delivered in the psychoeducation intervention, a self-guided exercise manual, free fitness center access for 12 weeks and a "continuing exercise manual" for the next 12 weeks. Fitness centers were open to the public so individuals could have contact with members who were not part of the study. Psychoeducation consisted of twelve 60-min group sessions. These sessions were outlined in a manual that emphasized problem-identification and goal-setting (Appendix 1). Sessions were co-lead by a nurse educator with expertise in PD and a trained peer educator with PD-Dep.

Peer-educators were individuals who have successfully managed PD-Dep and the ability to incorporate exercise into their life-style. They were asked to attend two half-day intensive training sessions that included interactive discussion of PD-Dep, as well as discussions regarding supportive listening, group leading, assistance with help-seeking pathways, crisis management and communication skills. After training, peer-educators participated in psychoeducation group sessions as a co-educator, taking an active role in the information-sharing and the question/answer portion.

Individuals in the EXCEED intervention received an exercise manual that outlined both resistance and aerobic training. The exercise sessions were three times a week for 45–60 min and were led by a certified personal trainer (ACE-PT). The program included small-group strength training with resistance tubing and high-cadence interval cycling on a spinning bike. All exercises were designed to minimize fall risk and the amount of time standing. During the high-cadence interval spinning (30 min), trainers started with 5 min of easy spinning and then encouraged the participants to increase their leg cadence up to 80 revolutions per minute (with music) for 1 min bouts, followed by 2–3 min of easy spinning for the next 20 min. Heart rate goals were within the 60–80% HRmax (heart rate maximum).[18] The sessions concluded with a 5 min cool-down of easy spinning. The resistance band program included four upper body exercises (Monday), four lower body exercises (Wednesday) and four combined exercises (Friday, Fig. 1). Spinning and resistance training intensity and difficulty progressed throughout the program. Resistance training progression was: week 1: No band, technique practice, weeks 2–3: 1 set/15 repetitions (reps), weeks 4–6: 2 sets/15 reps, weeks 7–9: 2 sets/12 reps, weeks 10–12: 2 sets/10 reps. If individuals could not complete the sets/reps, then they were instructed to choose an easier band.

The intent of the SGE intervention was to replicate the EXCEED activities in a self-guided format. The SGE intervention consisted of a written manual of the informational materials delivered in the psychoeducation intervention, as well as manualized self-guided exercise and fitness center access. Although this intervention provided flexibility in the timing of exercise, it did not include the group interactions or peer-education component. Individuals were introduced to the exercises by an exercise physiologist (ACSM Health Fitness Specialist). Personal trainers were also available to answer questions. Participants were asked to exercise three times per week and each received weekly phone calls during the first 12 weeks to report activity. The program included machine-based strength training and high cadence cycling on a recumbent exercise bike (Star Trac ERB recumbent). The SGE resistance program exercised the same muscle groups as EXCEED using Nautilus and Lifetime Fitness machines (Fig. 2). For the interval low-resistance cycling component, participants were instructed to warm up (first 5 min) at 50 rpm with low resistance (Level 1 or 2). During the high-cadence spinning (next 20 min), they were instructed to pedal between 80 and 90 rpm. Heart rate goals were 60–80% HRmax. For the cool down (last 5 min), they were instructed to return to 50 rpm. Cycling and resistance training intensity and difficulty progressed throughout the program similar to that describe in the EXCEED group (same sets and reps).

During the second 12 week period, individuals continued to have access to the fitness facility and were given a "continuing exercise manual" that included tips on exercise safety, the importance of continuing to exercise and directions on how to continue the exercise program. It suggested aerobic exercise (20–30 min, 2–3 times weekly, high-cadence stationary cycling), as well as resistance training 2–3 times per week. Both machine-based and resistance band exercise were illustrated in the manual (Figs. 1 and 2). Resistance training guidelines suggested using a weight that would allow for 2–4 sets and 8–12 repetitions for each set, as well as recommendations to increase the weight lifted every 4 weeks.

Primary outcome measures were number of exercise sessions completed and International Physical Activity Questionnaire (IPAQ) scores. Program adherence was determined by recording the number of exercise sessions over the 12 week exercise intervention. A research assistant recorded attendance in the EXCEED group and individuals in the SGE group were called weekly to record number of exercise sessions. Estimates of physical activity were calculated using the short form of the IPAQ[19] score at baseline, after the 12 week intervention and after the 12 week follow-up period (week 24). This questionnaire asked individuals to assess the days and time they spent in the last 7 days in four categories: (1) vigorous activity (heavy lifting, aerobics, fast bicycling), (2) moderate activity (light lifting, moderate bicycling), (3) walking (at least 10 min), (4) sitting (watching TV,

Please cite this article in press as: Ridgel AL, et al. Enhanced Exercise Therapy in Parkinson's disease: A comparative effectiveness trial. *J Sci Med Sport* (2015), http://dx.doi.org/10.1016/j.jsams.2015.01.005