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Effects of an Exercise Intervention on Body Composition in Older Adult Males Diagnosed with Parkinson's disease: A Brief Report

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Abstract

The investigation examined the value of a multifaceted exercise intervention on body composition and strength, in those diagnosed with Parkinson's disease (PD). 8 males subjects diagnosed with PD (69.13 ± 6.20 years) completed a previously introduced, 8-week, 24-session exercise intervention. A repeated-measures analysis of variance (ANOVA) demonstrated improvements in body composition and muscular strength following the exercise intervention. The data suggests the multifaceted exercise intervention is an effective tool for improving strength and body composition in males diagnosed with PD.

Objective

Approximately 500,000 Americans are affected by Parkinson's disease with nearly a 10% increase in new documented cases each year [1]. In anticipation of this trend, there is an increased interest in the effects of physiotherapy to improve neurological diseases such as Parkinson's disease (PD). Research has shown that those affected by the progression of PD are generally weaker, and tend to lose muscle mass more rapidly than healthy populations [2,3]. There is minimal data focusing on multifaceted exercise programs and body composition within the population. Therefore, the purpose of our study is to investigate the effects of a previously introduced active-assisted cycling and resistance training intervention [4], and its effects on body composition and strength in older adult males with PD.

Methods

Males, 61-74 years of age, diagnosed with PD were recruited from multiple local support groups. All participants successfully completed 24 exercise sessions over an 8-week period. The inclusion criteria for our subjects included a physician's consent as well as a Hoehn and Yahr diagnosis stages 1-3 [5]. Exclusion criteria included symptoms and diagnosis of cardiovascular, metabolic, or respiratory disease. This human subjects study was approved by the Kent State University Institutional Review Board.

Forty eight hours prior (Pre) to the first exercise session, participants completed a baseline assessment of body composition and muscular strength. The assessment included densitometry (weight, body-fat %, fat-free mass, and fat-mass) and the 1 repetition maximum chest press (1-RM) [4]. The assessment was repeated 48 hours subsequent (Post) the final exercise session. The 8-week exercise intervention consisting of 24 exercise training sessions (Table 1) was administered by a certified personal trainer (ACSM-CPT). The sessions began with a warm-up period of low intensity cycling followed by 5 minutes of flexibility training. Subjects then completed 30 minutes of active-assisted (Motomed Viva 2) aerobic cycling [6]. Following the aerobic training, individuals completed 30 minutes of anaerobic resistance training utilizing weight machines, closed kinetic chain activities, and variable resistance training. Five minutes of balance training was incorporated into the anaerobic training portion of the session. Each session concluded with a 5 minute static flexibility cool-down period. Ratings of perceived exertion (RPE) and heart rates (HR) were monitored during each session. Subjects were asked to maintain a RPE between 11-16 [7]. A two time-point (pre, post) repeated measures analysis of variance (ANOVA) was utilized to examine changes in physical characteristics.

Results

Eight Caucasian males diagnosed with PD (69.13 ± 6.20 yrs.; 181.05 ± 4.93 cm.) completed 24 multifaceted exercise sessions during an 8-week training period (Table 2). The ANOVA demonstrated significant ($p \leq 0.005$) decreases in body fat % and fat mass. The analysis also indicated significant increases in muscular strength ($p \leq 0.001$). There were non-significant changes in both weight ($p = 0.474$) and fat-free mass ($p = 0.611$). Aside from multiple physical improvements, subjects also reported an abundance of qualitative improvements including improvements in activities of daily living (ADL's).

Conclusions

Prior to the investigation, we hypothesized that the aforementioned exercise intervention [4] could improve physical strength and body composition in those diagnosed with PD. Research has previously explored aerobic interventions on physical fitness in both the elderly and the elderly suffering from PD [8]. Data has indicated that aerobic training such as treadmill walking and cycling can improve many symptoms of PD as well as improve physical fitness within the diseased population [5,6,8]. Previous research has also indicated physiotherapy as a useful aide to pharmacologic therapy for improving strength and other components of physical fitness in those suffering from PD [9]. Particularly resistance training has revealed enhancements in neural drive and co-activation, both contributing to improved strength and

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Mode	Frequency	Duration	Intensity
Aerobic (Active-Assisted Cycling)	3 days/week	30 min	50-85 RPM Steady-State
Anaerobic (multi-joint resistance training[a])	3 days/week	30 min	1-2 sets; 12-15 reps; 55 – 67% of 1-RM
Flexibility (stretching)	3 days/week	10 min total	Static stretching; 20 sec holds
Neuromuscular (gait and balance)	3 days/week	5 min	5 sets; 60 sec

[a] Resistance exercises include chest press, lat-pull down, shoulder shrug, bicep curl, triceps extension, leg press, leg curl, leg extension, hip bridge, toe/heel raise.

Table 1: Exercise intervention.

Variable	Pre-intervention	Post-intervention	P-value
Weight (lbs.)	186.21 ± 26.97	184.61 ± 27.53	P = 0.474
Body Fat %	25.21 ± 5.04	22.93 ± 4.27	P = 0.005*
Fat Mass (lbs.)	44.71 ± 9.35	39.72 ± 8.82	P = 0.004*
Fat-Free Mass (lbs.)	134.89 ± 15.39	133.10 ± 8.23	P = 0.661
1-RM bench press (lbs.)	69.75 ± 35.17	96.43 ± 37.92	P = 0.002*

*Denotes significance ($p \leq 0.05$) (M ± SD).

Table 2: Body composition and strength testing.

movement control [10]. Similar to the previous literature, the exercise intervention provided beneficial physical improvements in the PD sample. As hypothesized, the subjects maintained both weight and fat-free mass while improving body fat %. Our findings, thus far, suggest that the previously introduced intervention [4] promotes both improvements in body composition and strength specifically in older adult males with PD.

The investigation is unique as it is the first follow-up research utilizing a previously introduced multifaceted physiotherapy intervention [4]. The intervention proved both time efficient (8-weeks) and effective for improving body composition and strength in males diagnosed with PD. Data is currently being analyzed to determine the effectiveness of the intervention as an effective physiotherapy for combating physical decline in males suffering from PD.

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