Lifestyle Physical Activity Intervention Improves Body Composition in Multiple Sclerosis: Preliminary Evidence from a Randomized Controlled Trial

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INTRODUCTION

- There has been increasing interest in body composition in persons with multiple sclerosis (MS) and there is evidence that those with MS have an unhealthy body composition.
- An unhealthy body composition profile can increase the risk of secondary disease consequences, such as bone fractures and comorbid health conditions.
- Physical inactivity is a prevalent, but modifiable risk factor for possibly managing an unhealthy body composition profile. Consequently, increasing physical activity might favorably impact bone health and body composition in persons with MS.
- There is evidence that lifestyle physical activity interventions can be effective for improving body composition and chronic disease risk in healthy adults.[1] To date, no studies have examined lifestyle physical activity interventions for improving body composition among those with MS.

AIM To examine the efficacy of a physical activity behavioral intervention for improving outcomes of body composition in ambulatory persons with MS. We conducted a secondary analysis of data from a 6-month randomized controlled trial (RCT) that examined the efficacy of an internet-delivered, physical activity intervention for improving symptomatic outcomes.[2]

METHODS

Participants:

- Clinically definite diagnosis of MS
- Relapse-free during past 30 days prior to testing
- Age 18-64 years
- Internet access
- Not pregnant
- Ambulatory with or without an assistive device
- Inactive (< 30 minutes of moderate-to-vigorous physical activity (MVPA) on ≥ 2 days per week)
- Minimal risk for engaging in physical activity

Outcomes:

- Body mass index (BMI): calculated as weight in kilograms divided by height in meters squared (height and weight from laboratory assessment)
- Dual-energy X-ray absorptiometry (DXA): Whole body bone mineral content (BMC), bone mineral density (BMD), and soft tissue composition.
- Physical Activity: Godin Leisure-Time Exercise Questionnaire (GLTEQ) and accelerometer (minutes of MVPA).

INTERVENTION

The goal of the intervention was to increase lifestyle physical activity, primarily walking, and was based on previous versions of the intervention.[3-6] This was accomplished through: (1) a study website with information on becoming more physical active based on SCT; (2) self-monitoring and goal-setting using a pedometer activity log, and Goal Tracker Software; (3) and one-on-one web-based video coaching sessions with a behavioral coach. Participants in the control condition were instructed to maintain their usual behavior over 6-months.

RESULTS

TABLE 1. Demographic, clinical, and morphological characteristics of the sample and tests for pre-trial differences between conditions. Values are means (SD), unless otherwise noted.

Variable	Intervention (n=41)	Control (n=41)	*P* value
Age, years	48.4 (9.1)	49.5 (9.2)	.61
Sex, female/male	30/11	32/9	.61
Height, cm	169.4 (9.3)	167.6 (7.2)	.34
Weight, kg	79.8 (21.4)	77.6 (18.6)	.63
PDDS, mdn (IQR)	2.0 (4.0)	3.0 (3.0)	.12
SR-EDSS, mdn (IQR)	3.5 (4.25)	3.5 (4.5)	.69
Disease duration, years	10.6 (7.1)	13.0 (9.1)	.18
Disease course, RRMS/SPMS/PPMS	31/8/2	34/2/5	.08
MVPA, minutes	17.0 (22.4)	16.2 (17.7)	0.87
BMI, kg/m^2	27.9 (7.7)	27.6 (6.4)	0.86
BMI distribution			0.70
Under-normal weight, n (%)	16 (39.0)	16 (39.0)	
Overweight, n (%)	12 (29.3)	15 (36.6)	
Obese, n (%)	13 (31.7)	10 (24.4)	
Percent body fat	33.7 (8.8)	35.7 (7.8)	0.31
Whole body fat mass, g	26,799.8 (10,442.6)	27,804.7 (10,407.2)	0.67
Whole body lean soft tissue mass, g	48,480.4 (10,045.9)	46,355.2 (8,942.2)	0.33
Whole body bone mineral content, g	2275.5 (362.0)	2237.4 (366.4)	0.65
Whole body bone mineral density, g/cm^2	1.100 (0.089)	1.102 (0.100)	0.95

TABLE 2. Morphological characteristics post-trial per condition and tests for differences between conditions controlled for pre-trial body composition values. Values are adjusted marginal means (SE).

Outcome	Intervention (n=35)	Control (n=37)	*P* value
BMI, kg/m^2	28.2 (0.24)	28.2 (0.24)	0.86
Percent body fat	33.4 (0.36)	34.3 (0.35)	0.09
Whole body fat mass, g	26264.7 (483.9)	27611.7 (470.6)	0.05
Whole body lean soft tissue mass, g	48,102.7 (248.1)	48,484.5 (241.3)	0.28
Whole body bone mineral content, g	2,269.9 (8.7)	2,244.7 (8.5)	0.04
Whole body bone mineral density, g/cm^2	1.111 (0.003)	1.101 (0.003)	0.01
Physical activity			
GLTEQ	27.2 (3.0)	13.0 (3.0)	0.001
MVPA, minutes	19.5 (2.3)	13.8 (2.2)	0.07

DISCUSSION

This is the first study to examine changes in body composition in response to an internet-delivered lifestyle physical activity intervention in persons with MS.

Effect on bone: Those who participated in the internet-delivered behavioral intervention had higher whole body BMD and BMC compared to controls post-trial.

- Physical activity, primarily walking, can provide a mechanical stimulus to promote bone remodeling processes, consequently improving bone integrity.
- This is particularly important considering increased risk of fractures in MS due to the high prevalence of osteoporosis and susceptibility for falls.

Effect on soft tissue: Whole body fat mass and percent body fat were lower in participants in the intervention group than controls post-trial, and this approached statistical significance. There was no difference in BMI between groups post-trial.

- Favorable changes in soft tissue composition are particularly important considering the prevalence of comorbidities in MS, and the association of comorbidities with disease progression.
- BMI might not be the most appropriate indicator of changes in obesity in response to clinical intervention, although we are cautious in interpreting the role of BMI at this time.

CONCLUSIONS: We provide preliminary evidence that an internet-delivered lifestyle physical activity intervention improves bone health, and to some extent, body composition in persons with MS.

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