

The relationship between Vascular Comorbidities and Physical Activity in persons with Multiple Sclerosis

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Background

Vascular comorbidities are prevalent among persons with multiple sclerosis and have been associated with an increased risk of disease progression.¹ Previous literature has shown that physical activity (PA) was inversely associated with self-reported cardiovascular comorbidity symptoms and risk factors,² subclinical markers of atherosclerosis,³ and overall number of comorbidities in PwMS.^{4,5} However, to the best of our knowledge, no studies have reported the relationship between PA levels and diagnosed vascular comorbidities in PwMS.

Objectives

- 1) To explore the relationship between vascular comorbidities and different aspects of PA in PwMS.
- 2) To present the prevalence of vascular comorbidities based on PA category in PwMS.

Methods

Participants

- A total of 183 PwMS were included in this secondary analysis.
- Participants completed a one-time research visit to collect the following variables:

Variables Collected at Research Visit	
Demographics	• Age, gender, race, ethnicity
Disease Characteristics	• Disease duration • Disability level (Patient Determined Disease Steps: PDDS)
Anthropometry	• Body Mass Index (BMI) m ² /kg
Vascular Comorbidities	• Diabetes, hypertension, hyperlipidemia, peripheral vascular disease, and heart disease
PA	• International Physical Activity Questionnaire-Long Form (IPAQ-LF)

Physical Activity Variables

PA Category	Low	• Does not meet criteria to fit into moderate or high
	Moderate	• 30 min of at least moderate-intensity at least 5 days, or • 20 min or vigorous-intensity at least 3 days, or • Total PA of at least 600 MET/min/week over at least 5 days
	High	• Total PA of at least 1500 MET/min/week over at least 3 days of vigorous intensity, or • Total PA of at least 3000 MET/min/week over all 7 days.
Intensity Subscores	Walking	3.3 MET activities, totaled as MET/min/week
	Moderate	4.0-6.0 MET activities, totaled as MET/min/week
	Vigorous	8.0 MET activities, totaled as MET/min/week
Totals	Sitting	Minutes/week
	PA	Sum of walking, moderate, and vigorous MET/min/week

Methods cont.

Statistical Analysis

- Comparisons between PwMS with vascular comorbidities (n=78) and PwMS without (n=105) were completed:
 - Mann-Whitney U test: age, disease duration and PA Intensity and Totals.
 - Medians test: PDDS.
 - Chi Square: gender, race, ethnicity, and PA category.
- The prevalence of vascular comorbidities was reported for each category of PA.
- Analyses were performed using SPSS version 26 (SPSS, Chicago, IL).

Results

Table 1. Descriptive Statistics presented as Median (IQR) and comparisons for PwMS with vascular comorbidities and those without

	Vascular Comorbidity (n=78)	No Vascular Comorbidity (n=105)	P-value
Age (years)	60.0 (13.0)	48.0 (17.0)	< 0.001
Gender (#)	Female: n=61 Male: n=17	Female: n=80 Male: n=25	0.749
BMI	30.6 (10.6)	27.1 (8.3)	0.001
Race	American Indian/Alaska Native: n=0 Black/African American: n=11 White/Caucasian: n=67 Unknown: n=0	American Indian/Alaska Native: n=1 Black/African American: n=11 White/Caucasian: n=92 Unknown: n=1	0.574
Ethnicity	Hispanic or Latino: n=3 Non-Hispanic or Latino: n=75	Hispanic or Latino: n=11 Non-Hispanic or Latino: n=94	0.095
Disease Duration (years)	14.8 (12.7)	10.8 (11.0)	0.057
PDDS (score)	3.0 (3.0)	1.0 (3.0)	0.124
Physical Activity			
PA Category	Low: 21.8% Moderate: 44.9% High: 33.3%	Low: 21.0% Moderate: 33.3% High: 45.7%	0.195
Walking	297.0 (999.9)	726.0 (2145.0)	0.005
Moderate	1320.0 (1855)	1500.0 (2880.0)	0.577
Vigorous	0.0 (0.0)	0.0 (960.0)	0.010
Sitting Total	2730.0 (2235.0)	2520.0 (1635.0)	0.161
Total PA	2185.0 (3648.3)	2754.0 (5604.3)	0.103

Bolded indicates P < .05
PA measured in MET/min/week, except for Sitting Total (min/week) and PA categories

Table 2. Prevalence of Vascular Comorbidities for each PA Category

	Low PA (n=39)	Moderate PA (n=70)	High PA (n=74)
≥ 1 Vascular Comorbidity	43.6%	50.0%	35.1%
Hypertension	20.5%	31.4%	25.7%
Diabetes	15.4%	10.0%	1.4%
High Cholesterol	30.8%	32.9%	21.6%
Heart Attack	0.0%	1.4%	4.1%
Peripheral Vascular Disease	0.0%	0.0%	0.0%
Heart Disease	2.6%	4.3%	5.4%

Discussion

- PwMS with vascular comorbidities had a higher median age and BMI compared to those without, which agrees with previous literature.
- Physical Activity was only different for the Walking subscore and Vigorous subscore between PwMS with and with out vascular comorbidities, with PwMS without vascular comorbidities having higher scores.
- PwMS with low and moderate PA had the highest prevalence of High Cholesterol, followed by Hypertension, however PwMS with high PA had the highest prevalence of Hypertension, followed by High Cholesterol.
- The top three vascular comorbidities reported were Hypertension, Diabetes and High Cholesterol.
- The high PA group had the lowest prevalence of ≥ 1 vascular comorbidity, which was to be expected, however the moderate PA group had the highest prevalence rather than the low PA group, which was unexpected.

Conclusions

The findings here demonstrate that PwMS with Vascular comorbidities tend to walk and perform less vigorous PA throughout the week. Vascular comorbidities were prevalent in each PA category, therefore looking at the type of PA may be more useful in determining the relationship between vascular comorbidity and PA in PwMS. These results can be used to inform clinicians on what type of PA needs to increase in PwMS with vascular comorbidities and guide future interventional studies.

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