

Hemodynamic Responses Following 12 Weeks of Home-Based Exercise in Individuals with Multiple Sclerosis: Wave Separation Analysis

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Increased inflammation, which is related to cardiovascular disease and altered hemodynamics, is a common condition in individuals with multiple sclerosis (MS). Low to moderate intensity aerobic exercise has shown beneficial effects in reducing inflammation and blood pressure (BP) in individuals without MS. Low to moderate intensity exercise may benefit BP and pulse wave characteristics, in individuals with MS.

Purpose: To investigate the chronic responses to low to moderate intensity home-based exercise vs. stretching on blood pressure and pulse wave characteristics in individuals with MS.

Methods: 29 individuals (16 cycle exercise group, 13 stretching group) with MS participated in 12 weeks of home-based exercise. Both groups received weekly Skype counseling sessions to monitor for exercise compliance. Central BP was estimated and pulse waveforms were measured using applanation tonometry and separated into forward and reflected waves at: 1) baseline; 2) mid-point (6 weeks of training); and 3) after 12 weeks of training.

Results: Neither exercise nor stretching altered peripheral or central BP indices. However, aortic DBP approached a significant decrease after training ($p = 0.073$). Wave separation analysis did not show any change following 12 weeks of exercise or stretching. Forward and reflected pressure did not differ between groups.

Conclusions: The results suggest that moderate intensity home-based exercise did not change BP and had no effect on wave separation variables. The lack of change may be due to the subjects being normotensive. This population may need higher intensity exercise to elicit the beneficial hemodynamic changes including wave separation indices.

| Variables | Exercise | | | Stretching | | |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Baseline | Mid-Point | Post | Baseline | Mid-Point | Post |
| Aortic SBP (mmHg) | 107 ± 5.1 | 112 ± 4.3 | 107 ± 4.3 | 105 ± 4.2 | 104 ± 3.8 | 102 ± 3.8 |
| Aortic DBP (mmHg) | 73 ± 2.8 | 78 ± 3.1 | 75 ± 3.1 | 72 ± 3.3 | 73 ± 2.9 | 69 ± 3.1 |
| Brachial SBP (mmHg) | 116 ± 4.8 | 123 ± 4.4 | 117 ± 4.0 | 116 ± 4.3 | 114 ± 3.5 | 112 ± 3.8 |
| Brachial DBP (mmHg) | 72 ± 2.8 | 77 ± 3.1 | 74 ± 3.1 | 71 ± 3.3 | 72 ± 2.8 | 69 ± 3.1 |
| MAP (mmHg) | 87 ± 3.3 | 92 ± 3.4 | 90 ± 3.7 | 86 ± 3.3 | 86 ± 2.9 | 83 ± 3.1 |
| Forward Pressure (mmHg) | 24.8 ± 1.63 | 26.1 ± 1.55 | 25.2 ± 1.47 | 24.9 ± 1.55 | 26.4 ± 1.47 | 26.9 ± 1.93 |
| Reflected Pressure (mmHg) | 16.5 ± 1.67 | 14.7 ± 1.82 | 16.1 ± 1.52 | 15.9 ± 1.36 | 15.7 ± 0.91 | 17.7 ± 1.53 |
| Mean ± SEM | | | | | | |