

TITLE: The Effect of Progressive Non-Aerobic High-Intensity Maximal Effort Exercise (MEE) on the Health-Related Quality of Life in Patients with Multiple Sclerosis

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ABSTRACT:

BACKGROUND: Studies indicate that Multiple Sclerosis (MS) patients are less satisfied with the quality of their lives than healthy individuals in similar circumstances. Common symptoms experienced include fatigue, cognitive dysfunction, pain, spasticity, depression, bladder/bowel dysfunction and sexual dysfunction. Several pharmacological and non-pharmacological methods have been employed for such symptoms to try to increase quality of life and reduce the mortality rate.

Non-pharmacological methods recommended for MS patients include lifestyle modifications, exercise programs and physical therapy. MS patients easily fatigue during aerobic exercise but a non-aerobic progressive maximal effort exercise (MEE) protocol consisting of a few short, duration isometric and eccentric leg press and whole body lunges was previously seen to increase strength without increasing fatigue. The IsoPUMP® (Neuromuscular Engineering, Nashville TN) exercise system permitted safe conduct and measurement of muscle strength and duration during each exercise repetition.

HYPOTHESIS: Patients will experience an improvement in pain, sexual satisfaction, bladder and bowel function as reflected by a standard Health Related Quality of Life (HRQL) measurements.

MATERIALS & METHODS: Subjects with Extended Disability Severity Scores of 2-6 and diagnosed with MS for at least 2 years were recruited and consented for this multicenter study. Longitudinal functionality was calculated using the Multiple Sclerosis Functional Composite score (MSFC) derived from the standardized scores of the Paced Auditory Serial Addition Test (PASAT- 3") for cognitive function, 9-Hole Peg Test (9-HPT) for arm function, and 25-foot timed walk for ambulation. Multiple Sclerosis Quality of Life (MSQL) questionnaires were administered to evaluate HRQL changes.

All subjects performed MEE twice a week for 10 consecutive weeks using the IsoPUMP® equipment; each exercise lasted four seconds, was performed with simultaneous valsalva maneuver, and progressed from 3 repetitions for each exercise (week 1) to 5 repetitions (by week 7). They completed MSFC tests along with the MSQL questionnaires during the initial visit, six weeks into the study, at the end of exercise (10 weeks), and six and twelve weeks after the intervention had ended.

RESULTS: Of the 55 fully participating subjects, 44 had complete MSFC data; all but 2 of these subjects responded to the MEE as determined by the overall MSFC scores. MSQL pain effect scores decreased from baseline to the end of the exercise period (-1.26; p-value=0.06) and did not significantly change in the follow-up period after discontinuing the exercise (0.35; p-value=0.53). This strong trend suggests that the MEE intervention alleviated the effect of pain on subjects' quality of life and might have some lasting effect over a more prolonged period.

Sexual satisfaction scores were relatively unchanged by both the end of the exercise protocol (-0.29; p-value=0.77) and the six-week follow up session (0.18; p-value=0.84). Likewise, bladder dysfunction scores were unaffected both at the end of the exercises (0.09; p-value=0.89) and at week 16 (0.00; p-value=1.00). The difference in the bowel dysfunction score increased by an insignificant degree by the end of the MEE sessions (0.35; p-value=0.55) and beyond (0.40; p-value=0.51). These findings indicated that the MEE intervention did not have an effect on sexual satisfaction, bladder function, or bowel function among subjects.

CONCLUSION: According to the MSQL, subjects who participated in 10 weeks of progressive, non-aerobic maximal effort exercise reported a significant trend towards reduction in the effect of pain on their quality of life that may continue for weeks after discontinuing the MEE. However, no significant MEE effect was measured on sexual satisfaction, bladder function, or bowel function.

DISCUSSION: The underlying pathology and multiple medication side effects can easily confound thorough evaluation of the impact of any HRQL intervention in MS subjects and may result in varying results for each MSQL measure during the intervention. As some level of improvement from baseline was observed six weeks post MEE, consideration should include monitoring for both immediate and prolonged MSQL effects of non-pharmacological interventions. As with most exercise programs maintenance of many results requires ongoing involvement with that intervention.

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