



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

M.L. Kuchera, DO, FAAO¹; R.T. Dombroski, DO⁶; T. Vardy, DO (AUS)²; F. Thomas, MD, PhD³; S. O'Brien, MD, PT⁴; P. Yagnik¹, MD, PhD; K.Wenzel, MA⁴; S. Stoll, DO, PhD⁵; B. Stouch PhD¹; M.T. Wallin, MD, PhD⁶; I. Vargas¹, DO; O. Odutola¹; H. Lai¹



Philadelphia, PA: Veterans Administration Medical Center (VAMC), Center for Chronic Disorders of Aging, Human Performance & Biomechanics Lab, PCOM¹; Tweed Heads, North South Wales, Australia²; Saint Louis, MO: Saint Louis VAMC³; Denver, CO: Rocky Mountain Multiple Sclerosis Center, Colorado Multiple Institutional Review Board⁴; Fort Worth, TX: UNTHSCFW- Texas College of Osteopathic Medicine⁵; Washington DC: Washington VAMC⁶

Introduction

Studies indicate that patients with Multiple Sclerosis (MS) are less satisfied with the quality of their lives compared to healthy individuals in similar circumstances. Health-related quality of life (HRQL) questionnaires for people with MS (MSQL), focus on the negative effects of functioning and on patient outcome. Common symptoms experienced by patients with MS 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 are often fatigued easily during aerobic exercise. Non-aerobic maximal effort exercise (MEE) consisting of leg press and whole body lunges are thought to increase strength without increasing fatigue. The IsoPUMP[®] (Neuromuscular Engineering, Nashville TN) is an exercise device which allows the subject to safely exert maximal forces with both isometric and eccentric exercises.

Hypothesis

Patients will experience an improvement in pain, sexual satisfaction, bladder and bowel function as reflected by standard MSQL measures.

Methods

Of 78 subjects diagnosed with MS for at least 2 years (with Extended Disability Severity Scores of 2-6) taking part in this multicenter study, 55 individuals participated in the study to evaluate immediate and prolonged effects of an exercise protocol on standard quality of life measures.



Figure 1. IsoPUMP[®] exercise equipment Left: Total body lunge demonstration. Right: Leg press demonstration.

These subjects performed MEE twice a week for 10 consecutive weeks using the IsoPUMP[®] equipment (see figure 1). Leg press and whole body lunges were performed using isometric and eccentric contractions during each visit with increasing repetitions as the study progressed (3-5 reps, for 4secs each).

Functionality was longitudinally 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.

Throughout the study, Multiple Sclerosis Quality of Life (MSQL) questionnaires were administered to evaluate HRQL changes from the patient's perspective. The MSQL questionnaires: Pain Effect Scale (PES), Sexual Satisfaction Questionnaire (SSS), Bladder Control Scale (BLCS), Bowel Control Scale (BWCS) were used to assess the changes in the patient's perception of the quality of their life as the study progressed. An increase in the bladder, bowel and pain scores signify non-improvement or decline in quality of life as perceived by the subject. An increase in the sexual satisfaction score indicates a perceived improvement in sexuality. Arithmetic averages of the PES, SSQ, BLCS and BWCS scores were calculated for subjects that experienced an improvement in functionality based on their MSFC score.

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 MSFC.

Health- Related Quality of Life among MEE responders

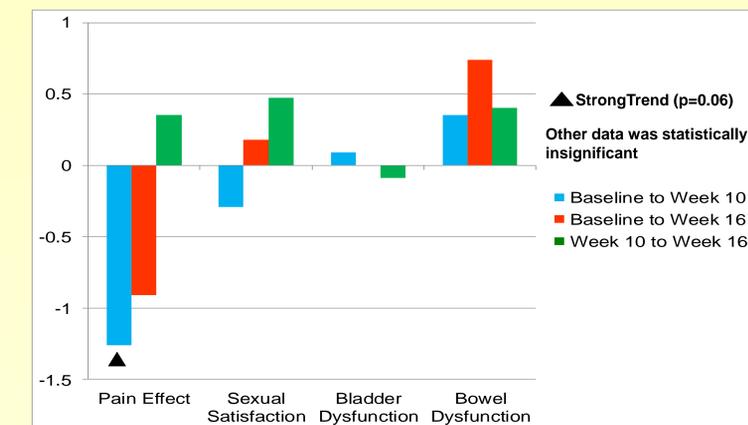


Figure 2- HRQL Measures among MEE Responders

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 (see figure 2).

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 (see figure 2).

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.

References

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