Previous PDF Next PDF

Multiple Sclerosis and Related Disorders 37 (2020) 101492

Contents lists available at ScienceDirect

Multiple Sclerosis and Related Disorders

journal homepage: www.elsevier.com/locate/msard

Original article

Effects of inspiratory muscle training in advanced multiple sclerosis

Min H Huang[a,*], Donna Fry[b], Lisa Doyle[c], Alexander Burnham[d], Nathan Houston[c], Keelin Shea[c], Hannah Smith[c], Lauren Wiske[c], Jessica Goode[c], Elizabeth Khitrik[c], Mackenzie Kolanda[c]

[a] Physical Therapy Department, College of Health Sciences, University of Michigan-Flint, 2157 William S. White Building, 303 E. Kearsley Street, Flint, MI 48502-1950, USA
[b] College of Health Sciences, University of Michigan-Flint, 3180 William S. White Building, 303 E. Kearsley Street, Flint, MI 48502-1950, USA
[c] Doctor of Physical Therapy Program, Franklin Pierce University, 670 North Commercial Street, Center Tower, Third Floor, Manchester, NH 03101, USA
[d] The Boston Home, 2049 Dorchester Ave., Boston, MA 02124, USA

ARTICLE INFO

Keywords:
Rehabilitation
Respiration
Multiple sclerosis
Exercise
Resistance training
Respiratory Muscles

ABSTRACT

Background: Respiratory training using Threshold Inspiratory Muscle Trainer (IMT) has not been examined adequately in multiple sclerosis (MS). The primary objective in this study of persons with advanced MS was to investigate the training effect of IMT. The secondary objective was to evaluate the retention of IMT benefits.
Methods: This study was a repeated measures within-subject design (before-after trial).. Participants were recruited from a long-term care facility specialized in progressive neurologic conditions. Thirty-six non-ambulatory persons with advanced MS volunteered. Inspiratory muscle exercise using the threshold IMT were performed daily for 10 weeks at 3 sets of 15 repetitions per day. Resistance was progressed weekly based on perceived rate of exertion and symptoms. Primary outcome measures were maximum inspiratory pressure (MIP) and maximum expiratory pressure (MEP) that were measured at baseline, after 5 and 10 weeks of IMT exercises (training period), and at 4 and 8 weeks after the IMT training ended (retention). Linear mixed-effect regression models with time (i.e. weeks from baseline) as the fixed factor and participants as the random effect factor were applied separately to test each hypothesis. Effect size was calculated using partial eta square (η2p). Two-tailed significance level was $p < 0.05$.
Results: Participants were 60.5 ± 8.6 years old. Expanded Disability Status Scale was 8.5 ± 0.4. Baseline MIP were 25.9 ± 16.4 cmH2O (33.2% % ± 19.8% of predicted values) and MEP were 23.5 ± 15.7 cmH2O (25.8% % ± 14.4% of predicted values). Compared to the baseline, MIP increased significantly to 30.1 ± 17.9 cmH2O (38.9% % ± 22.4% of predicted values) and 30.6 ± 17.6 cmH2O (39.6% % ± 22.3% of predicted values) after 5 ($p < 0.05$) and 10 weeks ($p < 0.05$) of IMT exercises. MIP improvements were retained in an 8-week washout period. MEP did not differ significantly by time.
Conclusion: In persons with advanced MS, 10-week IMT training increased inspiratory muscle strength. This