

outcomes were Peak Power Output (PPO) of a graded exercise test (Watts), 10-Meter-Walk-Test (10MWT), Two-Minute-Walk-Test (2MWT), Six-Minute-Walk-Test (6MWT), Timed-Up-and-Go-Test (TUG) and **Patient-Reported-Outcomes-Measurement-Information-System-Questionnaire (PROMIS)** at baseline (T_0) and discharge after three weeks (T_1).

Results: The study protocol is feasible (80% of participants completed 79% of planned series within planned sessions) and 88% of the data collection could be successfully achieved. Results of the interviews show high acceptability and motivation. The descriptive analysis of the secondary outcomes showed improvements of the mean values of all outcomes: Increase of 6.07% in PPO (T_0 : 133.75W, T_1 : 141.88W), of 15.28% in 2MWT (T_0 : 150.50m, T_1 : 173.50m), of 11.61% in 6MWT (T_0 : 453.00m, T_1 : 505.63m), of 19.85% in PROMIS (T_0 : 25.2, T_1 : 30.2) and a decrease of 8.70% in 10MWT (T_0 : 7.75s, T_1 : 7.13s) and of 18.17% in TUG (T_0 : 8.13s, T_1 : 6.88s).

Conclusion: SIT under hypoxia in pwMS on a cycle ergometer is feasible and improves patient-reported and health-related outcomes.

Submission ID: 95; Submission Group: Outcome Measures; Submitter: Laurits Taul-Madsen

A head-to-head study comparing the effects of aerobic and resistance exercise on fatigue in multiple sclerosis – secondary analyses from the MS Booster trial

Laurits Taul-Madsen¹, Lars G. Hvid^{1,2}, Ulrik Dalgas¹

¹Exercise Biology, Department of Public Health, Aarhus University, Denmark, ²The Danish MS Hospitals, Ry and Haslev, Denmark

Introduction: Fatigue is a complex, debilitating, and highly frequent symptom in people with multiple sclerosis (PWMS). The modified fatigue impact scale (MFIS) estimates fatigue and subdivides it into a physical (MFIS_{physical}) and a cognitive component (MFIS_{cognitive}). Both aerobic training (AT) and resistance training (RT) reduce fatigue. However, the effects of the two modalities have not been directly compared.

Objective: To perform a head-to-head comparison of the effectiveness of AT and RT on fatigue measured by MFIS in PWMS.

Materials & Methods: A total of 150 PWMS (45±8 years, EDSS score 2.7 ± 1.6, 73 % women) were enrolled and randomized in a 2:2:1 ratio into either 12 weeks of AT (n=60, 30 sessions), RT (n=60, 30 sessions), or control ('usual care', n=30). Pre and post intervention assessments of isometric knee extensor muscle strength (MVC; isokinetic dynamometry), aerobic capacity (VO_{2peak}; incremental exercise test), and fatigue (MFIS) were performed.

Results: Aerobic capacity increased in AT vs. control by 5.6 [2.0;9.2] mL O₂/min/kg (*mean [95CI]*) and in AT vs. RT by 3.6 [0.8;6.6], but not in RT vs. control (1.9 [-1.6;5.5]). Knee extensor muscle strength increased in RT vs. control by 1.03 [0.25;1.80] Nm/kg and in RT vs. AT 0.68 [0.27;1.08], but not in AT vs. control (0.35 [-0.42;1.13]). MFIS_{total} seemed not to be reduced in neither RT vs. control -5.6 [-14.9; 3.7] points nor in AT vs. RT

-2.6 [-9.1; 3.9], although a trend was observed in AT vs. control -8.2 [-17.5; 1.1]. MFIS_{physical} seemed not to be reduced in AT vs RT -0.59 [-3.7; 2.5], whereas a trend towards a reduction was observed in RT vs. control -4.3 [-8.8; 0.2] points alongside a reduction in AT vs. control -4.9 [-0.4;-9.4]. MFIS_{cognitive} remained unaffected in all groups.

Conclusion: No apparent differences were observed between the effects of AT and RT on fatigue (or its subcomponents). However, both modalities (AT in particular) seemed superior to control in eliciting reductions in MFIS_{physical}.

Submission ID: 96; Submission Group: ehilitation Effectiveness; Submitter: Tobias Gaemelke
Efficacy of Progressive Power Training in Enhancing Neuromuscular and Physical Function in Older Patients with Multiple Sclerosis: Preliminary Results from the PoTOMS Trial

Tobias Gaemelke¹, Peter Feys², Christoffer Laustsen³, Ulrik Dalgas¹, Lars G. Hvid^{1,4}

¹Exercise Biology, Department of Public Health, Aarhus University, Aarhus, Denmark, ²REVAL, Rehabilitation Research Center, Faculty of rehabilitation, Hasselt University, Hasselt, Belgium, ³The MR Research Center, Department of Clinical Medicine, Aarhus University, Aarhus, Denmark, ⁴The Danish MS Hospitals

Introduction: Exercise has demonstrated positive effects in young and middle-aged people with multiple sclerosis (pwMS) as well as healthy older adults. However, there is a paucity of evidence investigating the effects of exercise in older (≥60 years) pwMS, constituting a substantial and growing MS subpopulation.

Aim: The study aims to compare the effects of 24 weeks of progressive power training (PPT) with a usual care control group in older (≥60 years) pwMS on neuromuscular- and physical function, assessed at baseline and after 24 weeks.

Methods: The 'Power Training in Older MS patients' (PoTOMS) randomised controlled trial included 41 older pwMS, with 21 randomised to the PPT group (65±4 years, 3.5 [2.75;4.0] EDSS) and 20 to the control group (66±4 years, 3.5 [2.63;4.5] EDSS). Participants underwent leg-press dynamometry to evaluate maximal voluntary contraction (MVC) and rate of force development at 30 ms (RFD_{30ms}), maximal chair rise, timed 25-foot walk test (T25FWT), six-minute walk test (6MWT), and 9-step stair ascent (9SSA).

Results: At 24 weeks, between-group difference (mean difference [95%CI]) was observed for all selected outcomes, favouring the PPT group: Maximal chair rise power (4.8 W·kg⁻¹ [3.2;6.3], p<0.001), leg-press MVC (3.4 N·kg⁻¹ [1.6;5.2], p<0.001), leg-press RFD_{30ms} (440 N·s⁻¹ [8;873], p=0.046), T25FWT (0.44 m·s⁻¹ [0.29;0.59], p<0.001) 6MWT (54 m [42;67], p<0.001), 9SSA (0.03 flight of stairs ·s⁻¹ [0.01;0.05], p<0.004). In the PPT group, clinically meaningful improvements were observed in 57% of older pwMS for the T25FWT and 60% for the 6MWT.

Conclusion: PPT in older pwMS was safe and effective, eliciting improvements in neuromuscular function and physical function. These improvements in physical function were clinically meaningful in a substantial proportion of older pwMS. These results

highlight the effectiveness of applying PPT in this under-investigated subpopulation of older pwMS.

Submission ID: 97; Submission Group: Technology Supported Rehabilitation; Submitter: Jelka Jansa

The use of Intensive visual stimulation in multiple sclerosis – a case study

J Jansa¹, Z Spiclin², G Brecl¹

¹UMCL, Slovenia, ²The Faculty of Electrical Engineering, Slovenia

Objective: Intensive visual stimulation (IVS3) is a modern, computer-based device, assisting in motor planning and central control of movement in upper limb. It has proven useful with various neurological diseases, impacting on hand function. IVS3 was therefore applied to a person with multiple sclerosis (PwMS).

Methods:

Patient and procedure:

A PwMS, female, age of 62, with 32 years history of MS, secondary progressive type and with the Expanded Disability Status Scale of 6.5 was referred to outpatient Occupational therapy (OT). Over the period of last 10 months she was experiencing gradual weakness and tremor in her right/dominant hand, affecting her daily functioning. Self-perception of her performance of daily occupations/activities was assessed by the Canadian Occupational Performance Measure (COPM). Fingers dexterity were measured by the Nine Hole Peg Test (NHPT). In addition, dual-task performance was measured by adding cognitive interference (CI) while performing NHPT. Assessments were performed before starting OT and after 20 outpatient sessions. Each OT visit includes IVS3 (30 minutes) and additional counselling. IVS3 session was mainly targeting her right hand and few bimanual actions.

Results: Average COPM - performance improved from 5,5 to 7,7 (statistically important) and average COPM - satisfaction improved from 5,5 to 6,7 only. NHPT for left hand improved from 34,51sec to 31,63 and for right hand from 36.03 to 25,99 sec. NHPT with CI improved from 52,8 to 40,09 sec for left hand and from 59,05 to 43,66 for right hand. In addition, she spontaneously commented that she had been more aware of her right hand and consequently was including it more into daily activities.

Conclusion: The use of IVS 3 in a PwMS was useful in terms of improving finger dexterity, dual-task performance and integrating of affected hand into daily activities.

Submission ID: 98; Submission Group: Technology Supported Rehabilitation; Submitter: Angela Boschetti

"Pilot study on the feasibility of home-based cognitive remediation in People with Multiple Sclerosis (PwMS)"

Angela Boschetti^{1,2}, Michelangelo Dini^{1,2}, Marta Tacchini^{1,2}, Giulia Gamberini³, Mariaemma Rodegher³,

Alessandro Gradassi³, Giancarlo Comi^{1,3}, Letizia Leocani^{1,2}

¹San Raffaele Vita-Salute University, Milan, Italy,

²Experimental Neurophysiology Unit, Institute of Experimental

Neurology-INSPE, Milan, Italy, ³Neurorehabilitation Dep.t, Casa di Cura Igea, Milan, Italy

Background & Aims: Multiple Sclerosis (MS) presents with diverse symptoms, including Cognitive Impairment (CI). Traditional approaches to CI involve in-clinic-neurobehavioral protocols. However, researchers have highlighted issues associated with in-person rehabilitation. To address these challenges, remote rehabilitation tools have been proposed. The current study aims to investigate the feasibility of a telerehabilitation intervention utilizing a computer-based software.

Methods: People with MS (PwMS) experiencing objective cognitive deficits on at least one neuropsychological test were recruited from an MS Rehabilitation Centre. They were randomly allocated to either the Intervention Group (IG), receiving 3 months (3 45-minute sessions a week) of home-based rehabilitation with the RehaCom software, or the Control Group (CG), engaging in at-home computerized sham activities for an equivalent duration. Feasibility was assessed by comparing expected training hours to actual training hours.

Results: 12 PwMS in the IG (10 F; mean age= 57; mean education =14) completed on average 17.23 hours of rehabilitation, equivalent to 63.81 % of total planned training. Specifically, 8 PwMS in the IG (72.72 %) completed at least 1/2 of the prescribed training, while 6 (54.54 %) completed at least 2/3 of the expected training. Instead, 9 PwMS in the CG (6 F; mean age= 56; mean education =15) completed on average 19.66 hours, equivalent to 72.83 %. 8 PwMS in the CG (88.88 %) completed at least 1/2 of the prescribed training, while 6 (66.66 %) completed at least 2/3 of the expected training.

Discussion & Conclusion: These results demonstrate encouraging levels of adherence to home-based rehabilitation (and sham treatment) among PwMS, with participants completing, on average, over half of the expected training within the three-month period. This observation is pivotal as the effectiveness of telerehabilitation largely hinges on the practicality of home-based tools. Future research will need to assess efficacy of these techniques in depth.

Submission ID: 100; Submission Group: Other; Submitter: Susan Seddiq Zai

Driving simulator fitness in Multiple Sclerosis and its correlates in a cross-sectional and long-time observation

Susan Seddiq Zai¹, Roshan das Nair², Christoph Heesen¹, Carsten Buhmann³, Anya Pedersen⁴, Jana Pöttgen²

¹Institute of Neuroimmunology and Multiple Sclerosis (INIMS), Center for Molecular Neurobiology, University Medical Center Hamburg-Eppendorf, Hamburg, Germany, ²Health Division, SINTEF, Trondheim, Norway; School of Medicine, University of Nottingham, Nottingham, United Kingdom, ³Department of Neurology, University Medical Center Hamburg-Eppendorf, Hamburg, Germany, ⁴Department of Clinical Psychology and Psychotherapy, Institute of Psychology -Christian-Albrechts-University, Kiel, Germany

Background and Objectives: Research on driving ability in multiple sclerosis (MS) suggests that it might be at risk for unsafe