

Intervention description

“Effect of an Internet-based At-home Physical Training Protocol on Quality of Life, Fatigue, Functional Performance, Aerobic Capacity and Muscle Strength in Multiple Sclerosis Patients (ms-intakt)”

ClinicalTrials.gov identifier: NCT02771652

Study objective:

In this randomised controlled trial, the feasibility and effectiveness of an internet-based exercise intervention including the prescription of progressive strength and endurance training (e-training) for PwMS was investigated. Primary outcome was health-related quality of life, secondary outcomes were muscle strength, aerobic capacity and lung function, physical activity and fatigue.

Intervention

The e-training exercise program consisted of twelve weeks of resistance training performed twice weekly and endurance training with one training session per week. The exercise training was home-based and supervised via the internet.

Software platform/infrastructure

The core aim of the e-training software was the mediation of customised, progressive, strength-building exercise training via the internet. Prescription and supervision of exercises and incorporation of participants' feedback was organized via a browser-based software solution (motionNet e-Training, motionNET systems Ltd., Nürnberg, Germany, www.motionnet-systems.de) with separate therapist (back-end) and participant interfaces (front-end). No additional devices or software installation was needed. Via the e-training platform, a one-to-one support for each participant was implemented. Training support and communication took place asynchronously (not in real time) via a messaging service in the software and when required, by email and telephone. A social network for the participants to use among themselves was not set up.

Education

The e-training intervention began with a two-day, on-site training seminar on the content and procedures of the e-training intervention, summarized below:

- knowledge of action and effect: basic information on MS and exercise, strength training/endurance training with MS; dose and periodization of training
- Practice sessions: execution and discussion of basic strength exercises; body awareness exercises; heart rate measurement and endurance training
- Motivation and volition: Motivational help and advice regarding action planning and barrier management for the implementation of exercise in everyday life

- Familiarization with the software: general operation of the software, documentation of training, handling of the physical activity diary

The introductory seminar contained 12 sessions with 45 minutes duration each and was conducted within 2 days and in groups of between 4 and 12 persons. The seminar was standardized with manuals and powerpoint presentations for instructors and a folder with information material for participants.


Exercise prescription – strength training

According to the recommendations available at the time of study design and due to its good tolerability, strength training was declared core content of the intervention and prescribed twice weekly for a period of 12 weeks, with 2-3 sets per exercise. Repetitions were kept within an intended range of 12-20 repetitions, depending on the initial fitness levels and difficulty of the exercises. Between sets and exercises, a rest period of approximately 1–2 min was recommended.

Exercises were delivered as PDF documents, containing pictures and descriptions of the most important points for performing the exercise: initial position, movement description, final position and special considerations (see figure 1).

Übungsbeschreibung

Squat



Ausgangsposition

- Stabiler Stand, etwas breiter als hüftbreit
- Knie sind leicht gebeugt
- Füße zeigen leicht nach aussen
- Die Bauchmuskulatur ist angespannt
- Der Oberkörper ist aufrecht

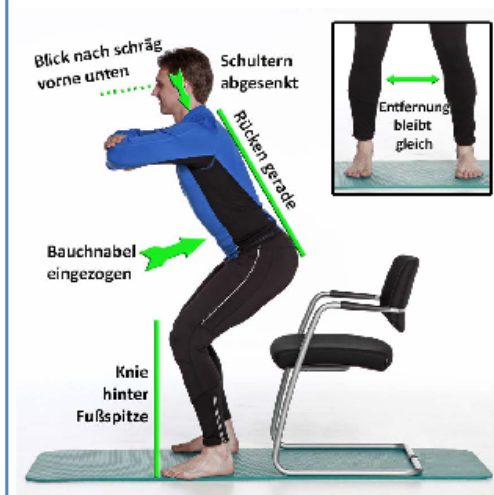
Bewegungsbeschreibung

- Einleitung der Bewegung durch hinausstrecken des Gesäßes nach hinten
- dadurch werden die Knie automatisch gebeugt
- der Oberkörper erhält eine leichte Schräglage nach vorne
- Der Rücken bleibt gerade (Bauchspannung!)

Endposition

- Das Gesäß berührt leicht den Stuhl, ohne dass man sich absetzt
- Rücken bleibt gerade (Bauchspannung!)
- Hauptlast ist auf den Fersen

Hinweise zur Ausführung



Viel Spass und Erfolg beim Training!

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Figure 1: exercise description as used in PDF documents in the e-training intervention (“Ausgangsposition” = initial position, “Bewegungsbeschreibung” = movement description, “Endposition” = final position, “Hinweise zur Ausführung” = special considerations for execution of the exercise).

A training plan contained 5-8 exercises for the most important groups of muscles: abdominals, lower back, upper back/arms, quadriceps, and abductors. All the exercises could be done at home, the only training aids used were latex exercise bands or large gymnastic balls. Therapists could choose from a catalogue of about 150 exercises that were systematically categorized according to trained muscle groups and difficulty level. Difficulty levels were determined according to required muscular effort, balance and stabilization demands (e.g. double leg stance vs. single leg stance, different support surfaces), number of involved joints (single vs. multiple joint exercises), degree of freedom of joint movements, or applied weights/resistance (e.g. additional weight in a backpack, different elastic bands). For each muscle group to be trained there were at least 5 different exercises with successively increasing difficulty. Thus, different initial fitness levels of participants and standardized, yet individual training progression could be accounted for.

Exercise prescription – endurance training

In addition to strength training, to facilitate effects on aerobic fitness and quality of life, endurance training with one session per week was prescribed. Based on the spiroergometric evaluation, recommendations regarding the intensity of jogging, walking, cycling and swimming were made. The training heart rate (THR) was determined via the V-Slope method, using the first ventilatory threshold (VT1) and the second ventilatory threshold (VT2): $THR = [(VT2 - VT1) / 3] + VT1$. The form of activity for the endurance training was freely selected, duration (between 10-60 minutes) was adjusted to individual fitness levels. In contrast to the strength training, the endurance training was, however, not systematically progressed after recommendation of training parameters.

Progression of training load for strength training

The number of series and repetitions to be completed for each exercise were prescribed individually for each participant and training session, and were depending on fitness levels. To ensure training overload and progression, we used a standardized progression scheme ranging from at least 2 times 6 repetitions up to a maximum of 3 times 20 repetitions. The progression scheme had an increment of 2 repetitions with altering numbers of sets (between 2 and 3). Training intensity was regulated by the participant's subjective, perceived exertion, which was rated between 6 and 20 on the BORG Scale. Therapists aimed at eliciting a BORG Feedback of between 11 (fairly light) and 16 (hard). If successful, the next progression step was prescribed for the respective exercise. If the final progression stage of 3 times 20 repetitions was reached, therapists prescribed the next more demanding exercise for the same muscle group (see figure 2). This procedure enabled an individualized progression of training load that was, at the same time, standardized.

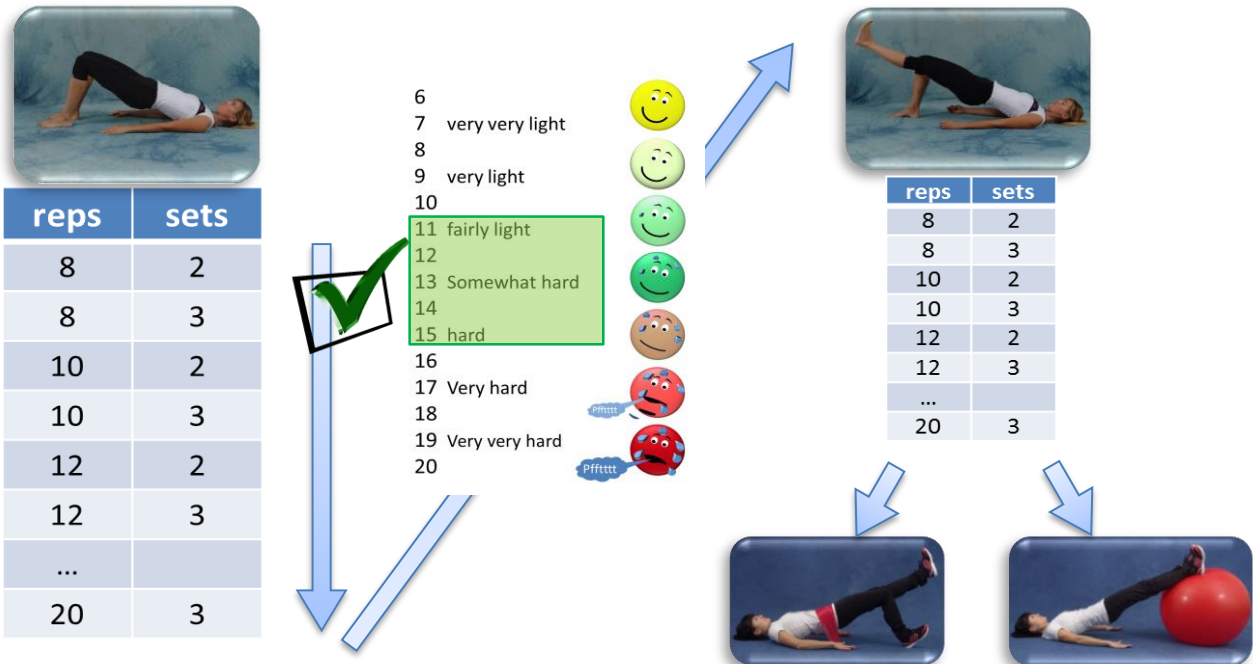


Figure 2: progression of training load

Physical activity diary

All the training sessions could be planned and documented in an online exercise journal, which could also be seen by the therapist. Every training session, including all the exercises and associated training load parameters, was automatically stored electronically after documentation from the participants.

Control condition

After the initial assessment on entry, those assigned to the control group were instructed to maintain their previous physical activity behaviour. After waiting 3 months, they received the same e-training intervention as the intervention group had received from the start.

Additional information

After study completion, the e-training intervention was transformed into a patient education program (§43 SGB V, "ergänzende Leistung zur Rehabilitation") that can be accessed by persons with multiple sclerosis in Germany. The program costs for the 3 months program (279€) can be refunded by some insurance companies. More information can be retrieved on the homepage www.ms-intakt.de.