

Sports Medicine 3-225**EFFECT OF RELOADING IN IMMOBILIZED MICE SOLEUS MUSCLE**

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Introduction

Skeletal muscle shows high plasticity in response to external conditions, which leads to hypertrophy or atrophy depending on the differences in stimulation levels. However, skeletal muscle which occurs with atrophy exhibits not only recovery, but also damage by reloading following hindlimb suspension or cast immobilization (1), because it might be susceptible to external stress. The present study aimed to explore the recovery of mouse soleus muscles following immobilization in the shortened position.

Methods

The soleus muscles of 7-week-old female ICR mice were used in this study. Under anesthesia, the left hind limb was immobilized at the ankle joint in maximum planter flexion for 10 days. Following immobilization, the cast was removed and the animals were allowed to reload freely in their cages. Left soleus muscles were removed immediately after immobilization (day 0, prior to reloading), 2, 5, 7 and 10 days after reloading. Age-matched mice were used as controls in each reloading period. The soleus muscle was evaluated by muscle wet mass, cross-sectional area (CSA) and frequency of central nucleated fibers (i.e. regenerating muscle fibers). As for detection of the loss of sarcolemmal integrity, Evans blue dye (EBD) positive fibers were searched (2). Results were analyzed using 1-way analysis of variance. If statistical significance was achieved ($P < 0.05$), pairwise comparisons were performed using Scheffe's method.

Results**1. Muscle wet mass**

Muscle wet mass was significantly decreased compared with the age-matched control group ($P < 0.01$) at 0 day reloading. At 5 days and 10 days reloading, there was no significant difference in muscle wet mass compared with each age-matched control group.

2. Fiber cross-sectional area

CSA of the 0 day reloading group was significantly smaller compared with the age-matched control ($P < 0.01$). CSA was recovered with time; there was no significant difference between the 10 days reloading group and the age-matched control group.

3. Frequency of central nucleated fibers

Regarding the mean frequency of central nucleated fibers, there was no significant difference among all experimental groups. The mean frequency of central nucleated fibers was less than 3%, which is considered within the normal limit.

4. Frequency of EBD positive fibers

EBD positive fibers were not observed in all experimental groups.

Discussion/Conclusion

In this experiment, remarkable muscle damage, such as sarcolemmal disruption was not observed by reloading following immobilization. After 5 days reloading, there was no difference in muscle wet weight, whereas CSA was significantly smaller compared with the controls. Thus, it seems likely that muscle edema occurred in the early stage after reloading.

References

- 1) Frimel TN et al. (2005). *Muscle and Nerve* 32: 605-612
- 2) Matsuda R et al. (1995) *J Biochem* 118(2): 959-964

Keywords: Recovery, Skeletal Muscle, Rehabilitation

Sports Medicine 3-226**EFFECTS OF 8 MONTHS OF EXERCISE THERAPY IN WARM WATER FOR FIBROMYALGIA ON PHYSICAL FUNCTION, FITNESS AND DISEASE IMPACT IN AFFECTED WOMEN**

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Introduction: The fibromyalgia syndrome is a chronic disorder characterised by generalised pain, muscle stiffness, reduced physical condition and fatigue that limit their daily life activities. Little knowledge is available on the feasibility and effects of long-lasting physical training in warm water on major physical abilities related with everyday life in patients with FM. The aim of the present study was to evaluate the feasibility and effects of 8 months of supervised exercise therapy in warm water on physical function, fitness and disease impact in women with fibromyalgia.

Methods: Thirty women with fibromyalgia [mean \pm SD] age 50.8 ± 8.7 (years); body mass index 27.7 ± 4.1 (kg/m²); duration of symptoms 19.8 ± 7.4 (years); number of tender points 17.0 ± 1.0 ; number of specific drugs 1.4 ± 0.8 (antidepressives, muscular relaxants and analgesics); were randomly assigned into 2 groups: an experimental group, performing 3 weekly sessions for 60 minutes of exercise therapy in warm water (n=15); and a control group, continuing their usual care and habitual leisure-time activities (n=15). Physical function and fitness were evaluated using the following tests: 10-m maximal walking speed, 10-step stair-climbing, blind one-leg stance, hand-grip dynamometry and Canadian Aerobic Fitness. The disease impact was evaluated using the Fibromyalgia Impact Questionnaire (FIQ). The data was examined by applying statistical tests for the analyses of variances.

Results: Patients in both groups were in a similar condition at baseline. After 8 months of exercise therapy, the experimental group showed improvements in several aspects of physical function and fitness, such as balance (30%; $p = 0.031$), maximal walking speed (6%; $p = 0.006$), stair-

climbing capacity with no extra weight (14%; $p=0.003$) and 10 kg-weighted (25%; $p=0.002$) and maximal oxygen uptake (8%; $p=0.015$). These patients also showed ameliorations of the disease impact in terms of pain (9%; $p=0.040$), stiffness (53%; $p=0.015$), anxiety (41%; $p=0.037$), depression (28%; $p=0.030$) and self-perceived physical function (20%; $p=0.047$), with an overall reduction in the total FIQ score (18%; $p=0.017$).

Conclusion: 8 months of aquatic exercise therapy for fibromyalgia was feasible and led to relevant improvements in physical function and fitness, reducing the disease impact in FM women.

Keywords: Physical Therapy, Fibromyalgia

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LONG-LASTING AQUATIC EXERCISE THERAPY IMPROVES HEALTH-RELATED QUALITY OF LIFE AND MUSCLE STRENGTH IN WOMEN WITH FIBROMYALGIA

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Introduction: Patients with fibromyalgia (FM) present muscle pain, weakness and fatigue that may eventually lead to reduced physical activity and decreased health-related quality of life. The purpose of the present study was to evaluate the effects of 8 months of supervised exercise therapy in warm water on health-related quality of life and muscle strength in women with fibromyalgia.

Methods: Thirty women with fibromyalgia [mean \pm SD] age 50.8 ± 8.7 (years); body mass index 27.7 ± 4.1 (kg/m²); duration of symptoms 19.8 ± 7.4 (years); number of tender points 17.0 ± 1.0 ; number of specific drugs 1.4 ± 0.8 (antidepressives, muscular relaxants and analgesics); were randomly assigned into 2 groups: an experimental group, performing 3 weekly sessions for 60 minutes of exercise therapy in warm water ($n=15$); and a control group, continuing their usual care and habitual leisure-time activities ($n=15$). Health related quality of life was evaluated using the Short Form 36 Questionnaire (SF-36). The SF-36 assesses eight dimensions: physical function, role physical problems, body pain, general health perception, vitality, social function, role emotional problems and mental health. The scale of each dimension runs from 0 (very poor) to 100 (very good). Maximal unilateral isokinetic strength was measured in the knee extensors and flexors in concentric and eccentric actions at the velocity of 60°/s. The data was examined by applying statistical tests for the analyses of variances.

Results: Patients in both groups were in similar condition at baseline. After 8 months of water exercise therapy, the experimental group showed improvements in phys-

ical function (16%; $p=0.017$), role physical problems (25%; $p=0.045$), body pain (58%; $p=0.001$), general health perception (33%; $p=0.012$), vitality (40%; $p=0.001$), role emotional problems (99%; $p=0.03$) and mental health (52%; $p=0.025$). The experimental group showed increments in maximal isokinetic strength of knee extensors at 60°/s in concentric muscle action (right leg: 30%, $p=0.017$; left leg: 18%, $p=0.042$) and knee flexors (right leg: 67%, $p=0.021$; left leg: 50%, $p=0.007$). Patients in the experimental group also improved maximal isokinetic strength at 60°/s in eccentric muscle action in knee extensors (right leg: 31%, $p=0.001$; left leg: 23%, $p=0.048$).

Conclusion: Long-lasting exercise therapy in warm water was effective to improve health-related quality of life (especially emotional problems, pain, mental health and vitality) and muscle strength in the lower limbs at low velocities.

Keywords: Water, Physical Therapy, Fibromyalgia

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USING PSYCHOLOGICAL INTERVENTION TECHNIQUES IN SPORTS INJURY REHABILITATION: CHARTERED PHYSIOTHERAPISTS IN THE UK TELL THEIR STORIES

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In sport psychology, there is a need to deviate from traditional research methods and move towards a more diverse means of analysing data (Biddle, Markland, Gilbourne, Chatzisarantis, & Sparkes, 2001). Past research into chartered sport physiotherapists' perceptions about psychological aspects of their work in the UK has included three quantitative surveys (e.g., Hemmings & Povey, 2002) and two qualitative studies (Jevon & Johnston, 2003; McKenna, Delaney, & Phillips, 2002). Despite the gradual growth of literature, thus far no studies have investigated physiotherapists' personal experiences in using psychological intervention techniques in detail. By using Interpretative Phenomenological Analysis (IPA; Smith, 1996) as a method of analysis, this study aimed to gain an insight into their own experiences of utilising psychological techniques with injured athletes.

Seven (4 female, 3 male) chartered physiotherapists working in sports medicine in the United Kingdom participated in the study. A semi-structured interview schedule was devised and it focused on the physiotherapists' personal experiences of using psychological intervention techniques (e.g., goal-setting, imagery, self-talk, relaxation, social support) in their work.

The IPA analyses revealed several prominent and fascinating themes. Physiotherapists were very open about their lack of formal training in sport psychology, and appeared to be incredibly knowledgeable and comfortable with the use of goal setting. Familiarity with other techniques (i.e., imagery, relaxation, and self-talk) appeared to be less apparent. They also placed great prominence on