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Improvements of muscle strength predicted benefits in HRQOL and postural balance in women with fibromyalgia: an 8-month randomized controlled trial

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Objective. To evaluate whether changes in muscle strength due to 32 weeks of supervised aquatic training predicted improvements on health-related quality of life (HRQOL).
Methods. Thirty women with FM aged 50.8 ± 8.7 years were randomly assigned to an experimental group ($n = 15$), performing 3 weekly sessions of 60 min of warm-water exercise; or to a control group ($n = 15$). HRQOL was evaluated using the Short Form 36 Health Survey (SF-36). Maximal unilateral isokinetic strength was measured at 60°/s and 210°/s in the knee extensors and flexors in concentric action and at 60°/s in knee extensors eccentric action. Postural balance was evaluated using the one-leg stance, eyes closed.
Results. After 32 weeks of water exercise therapy, statistically significant improvements occurred in concentric knee flexors and extensors strength at 60°/s, in eccentric knee extensors and in postural balance. The treatment led to additional improvements in physical function, role physical problems, body pain, general health, vitality, role emotional problems and mental health dimensions of SF-36. Gains in the concentric knee flexors strength predicted improvements in role of physical problems, whereas those in concentric knee extensors did the same for mental health and role emotional problems. Gains in eccentric knee extensors strength predicted improvements in postural balance.
Conclusions. A long-lasting exercise therapy in warm water produced relevant gains in muscle strength at low velocities of movements, some of which predicted improvements in physical problems, emotional problems, mental health and balance.
Trial registration. International Standard Randomized Controlled Trial Number ISRCTN53367487, information available in http://www.controlled-trials.com/ISRCTN53367487.

Key words: Fibromyalgia, Pool exercise, Muscle strength, Quality of life.

Introduction

FM is a rheumatological syndrome of unknown aetiology in which patients are characterized by a variety of symptoms, such as pain, muscle weakness, fatigue or balance problems [1–3] leading them to reduced health-related quality of life (HRQOL) [4]. FM symptoms can be successfully treated by aquatic training. Most of the earlier studies have shown that short periods (5–24 weeks) of water exercise may induce benefits, especially in neuromuscular condition [5], physical fitness [6, 7] and QOL [5, 6, 8–10]. For example, in our earlier randomized controlled trial (RCT) of 12 weeks of duration, we observed that warm-water exercises at low intensity, combining strength and aerobic activities induced important benefits in strength, pain, physical fitness and HRQOL [5, 6]. A critical observation in this earlier study was that these ameliorations in the FM symptoms were reversed to initial levels after an equal period of physical inactivity following the exercise therapy. This indicated that FM patients may require regular, long-lasting exercise therapy to possibly achieve unremitting benefits.

The neuromuscular condition of the FM patients can be improved with several weeks of water exercise. For example, in our earlier RCT of 12 weeks of water exercise [5], we found positive effects of this exercise on concentric and eccentric leg muscle strength. However, these preliminary results from our 12-week RCT also suggested that a better recuperation of optimal levels of eccentric strength in particular could require longer periods of training, as the improvements were small. An adequate recuperation and tuning of both concentric and eccentric muscle strength in knee flexors and extensors is important for these patients because it may for instance attenuate balancing problems, which is one of the most common disturbances in FM [3, 11].

With this idea, our group developed a new RCT of 8 months of water exercise. In initial reports from this 32-week trial, we concluded that long-lasting exercising in warm water was feasible, cost effective and led to long-term improvements in physical fitness, disease impact and anxiety status relatively similar in magnitude to those of shorter therapy programmes [12, 13]. To broaden this knowledge, the present report aims to provide further understanding of the effects of long-lasting water exercise in two possible ways: first, by analysing whether combined strength and endurance type water exercise may induce additional benefits in neuromuscular condition (isokinetic muscle strength and postural balance) and HRQOL of the FM patient; and secondly, whether the changes in the neuromuscular condition are associated with improvements in postural balance and HRQOL of the patients. This latter knowledge will allow researchers and clinicians to better characterize changes induced by a given long-lasting therapy, and to hypothesize about the mechanistic relation of possibly clustered benefits.

Subjects and methods

Study sample

Forty potentially eligible subjects responded to advertisements placed in the local newsletters. Once the study protocol was explained to them, 38 persons gave their written informed consent

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