Intensive aquatic resistance training promotes cartilage health and quality in knee osteoarthritis

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Postmenopausal women with mild knee osteoarthritis, who may avoid strenuous exercise due to pain, can safely promote cartilage health and improve aerobic fitness with intensive aquatic resistance training.

This was observed in a study carried out in the Department of Health Sciences at the University of Jyväskylä, Finland. The study investigated the efficacy of aquatic resistance training on the tibiofemoral cartilage quality, cardiovascular fitness and osteoarthritis-related pain in postmenopausal women with mild knee osteoarthritis. The study was conducted in cooperation with the Central Finland Central Hospital, the Department of Medical Technology, Institute of Biomedicine at the University of Oulu, Finland and the Department of Orthopaedics and Traumatology at the University of Helsinki, Finland.

Eighty-seven 60 to 68 years old eligible postmenopausal women with knee pain and radiographically confirmed osteoarthritis-related changes in the knee joint were enrolled into the study and randomly assigned into either a training group or a control group. The participants in the training group completed one hour of intensive aquatic lower limb resistance exercises three times a week for four months. The control group maintained usual care and were asked to continue their usual leisure time activities. The effect of aquatic resistance training on the biochemical composition of knee cartilage was measured by T2 relaxation time and dGEMRIC index, a MRI method specifically designed for the purpose.

"Osteoarthritis-related knee pain commonly results in the avoidance of high intensity physical activities which are required to maintain cartilage health and cardiovascular fitness. Aquatic resistance training at high intensities is a safe and well tolerated exercise modality and produces a sufficient stimulus promoting cartilage health and cardiovascular fitness," say doctoral students, physiotherapists Matti Munukka and Benjamin Waller.

Aquatic exercise for cartilage health

Aquatic exercise has been shown to decrease pain and improve function in people with knee osteoarthritis, although it is commonly considered to be of insufficient stimulus to affect cartilage.

This study showed that high intensity aquatic resistance training sufficient to cause improvements in cardiovascular fitness produced a sufficient stimulus to improve collagen orientation and decrease hydration in articular cartilage. A loss of collagen orientation and increase in hydration are early signs of changes related to osteoarthritis. While the training was very intense, with over 400 to 500 repetitions per session, compliance to the program was extremely high and tolerance to the training was good. The clinical significance of this study is that high repetitions of low-impact aquatic resistance exercises can improve cartilage health and quality while increasing cardiovascular fitness.

The results of this study will be published in the series of *Osteoarthritis and Cartilage*. The research was funded by the Academy of Finland, the Social Insurance Institution of Finland (Kela), the Finnish Cultural Foundation and the Yrjö Jahnsson Foundation.

  More information: M. Munukka et al. Efficacy of progressive aquatic resistance training for tibiofemoral cartilage in postmenopausal women with mild knee osteoarthritis: a randomised controlled trial, *Osteoarthritis*