Effects of sensorimotor training in patients with wrist osteoarthritis – a randomized controlled trial

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Research group: Sara Larsson, RPT, MSc; Lars B. Dahlin, MD, PhD; Elisabeth Brogren, MD, PhD; Elisabeth Ekstrand, RPT, PhD. Skåne University Hospital, Malmö, Sweden. Department of Translational Medicine, Lund University, Sweden.

Authors: as above.

Background: Patients with wrist osteoarthritis (OA) may suffer from pain, decreased range of motion (ROM) and reduced grip strength (1, 2). Although these impairments can have a significant impact on the patient's ability to perform daily activities and to participate in society (3), very little attention has been paid to specific rehabilitation regimes for this group of patients. The sensorimotor function in an OA affected joint can be disturbed with a negative effect on balance, muscle function, functional ability, and a changed movement pattern (4, 5). Exercises that focus on the sensorimotor control have shown good results in the treatment of other OA affected joints, such as knee and hip (4, 6). However, there are no previous studies that have evaluated the effects of sensorimotor training on wrist OA. Within this framework, we test the hypothesis that sensorimotor training improves the sensorimotor control, and thereby decrease pain and enhance functional ability, in patients with wrist OA.

Aim: The aim is to evaluate whether sensorimotor training is an effective treatment for patients with wrist osteoarthritis.

Material and methods: This study is a single-blinded randomized controlled trial (RCT) in patients with symptomatic and radiographically verified wrist OA with two treatment arms. The participants will be randomly assigned either to sensorimotor-control based exercises in combination with traditional OA treatment (i.e. joint protection with a wrist orthosis, range of motion (ROM) exercises, ergonomic advice, and modification of activities at work and leisuretask-specific training; *sensorimotor group*) or to ROM exercises only in combination with the previous mentioned traditional OA treatment (*control group*). The training will

consist of home exercises twice a day for three months. The treatments will be followed up by the treating physiotherapist at the department of hand surgery in Malmö, Sweden at 2-, 6- and 12-weeks post baseline, and the participants will be contacted by telephone at 4- and 8-weeks post baseline. Assessments will be performed at baseline and at 3, 6, and 12 months after baseline by an independent assessor, who is blinded to the participants' group allocation. At the 3- and 6-months follow-up, the participants will rate their global rating of change (GROC) regarding how they perceive their wrist pre- and post-training.

Primary outcome: Patient-Rated Wrist Evaluation (PRWE).

Secondary outcomes: Wrist range of motion (ROM), Numeric Pain Rating Scale (NPRS), Disabilities of the Arm, Shoulder and Hand (DASH) and General Self-Efficacy Scale (GSE).

Statistical analysis plan: Descriptive statistics [mean (SD) or median (minimum– maximum)] will be used to characterize the study groups. A power calculation has been performed with PRWE as the primary outcome, indicating that 48 participants will be sufficient to be included. To analyze potential differences between the groups, the Mann-Whitney test (for ordinal data) or independent sample t-test (for continuous data) may be used. The Wilcoxon signed-rank test or paired t-test may be used to analyze within-group differences. The level of statistical significance will be set at $p \leq 0.05$. All calculations will be performed using IBM SPSS Statistics version 28 (IBM Corporation, Armonk, NY, USA).

Ethics: The study was approved by the Swedish Ethical Review Authority, Dnr 2019-02437 and 2020-03807.

Time plan: Data collection 2019-2023. Analyzes and manuscript writing 2023-2024.

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