

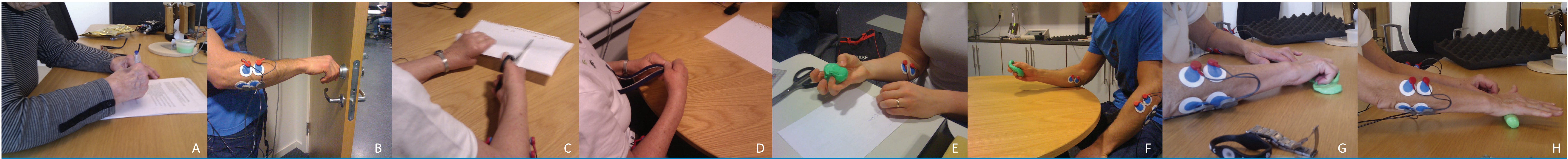
Hand Flexor and Extensor Muscle Activity in Daily Activities and Hand Exercises

in Women with Rheumatoid Arthritis or Hand Osteoarthritis

S. Brorsson^{1,2}, A. Nilsdotter³, C. Thorstensson⁴, A. Bremander^{1,4}

¹Department of Exercise Physiology, Biomechanics and Health, School of Business and Engineering, Halmstad, Sweden, ²Health and welfare, Dala Sports Academy, Dalarna University, Falun, Sweden,

³Department of Research and Education, Halmstad Central Hospital, Halmstad, Sweden, ⁴Research and Development Centre, Spenshult, Oskarstrom, Sweden



OBJECTIVES

To study muscle activation in forearm flexors and extensors during daily activities and clinically well used hand exercises in women with RA, HOA and healthy controls to better understand what hand exercises will be most useful in a training program.

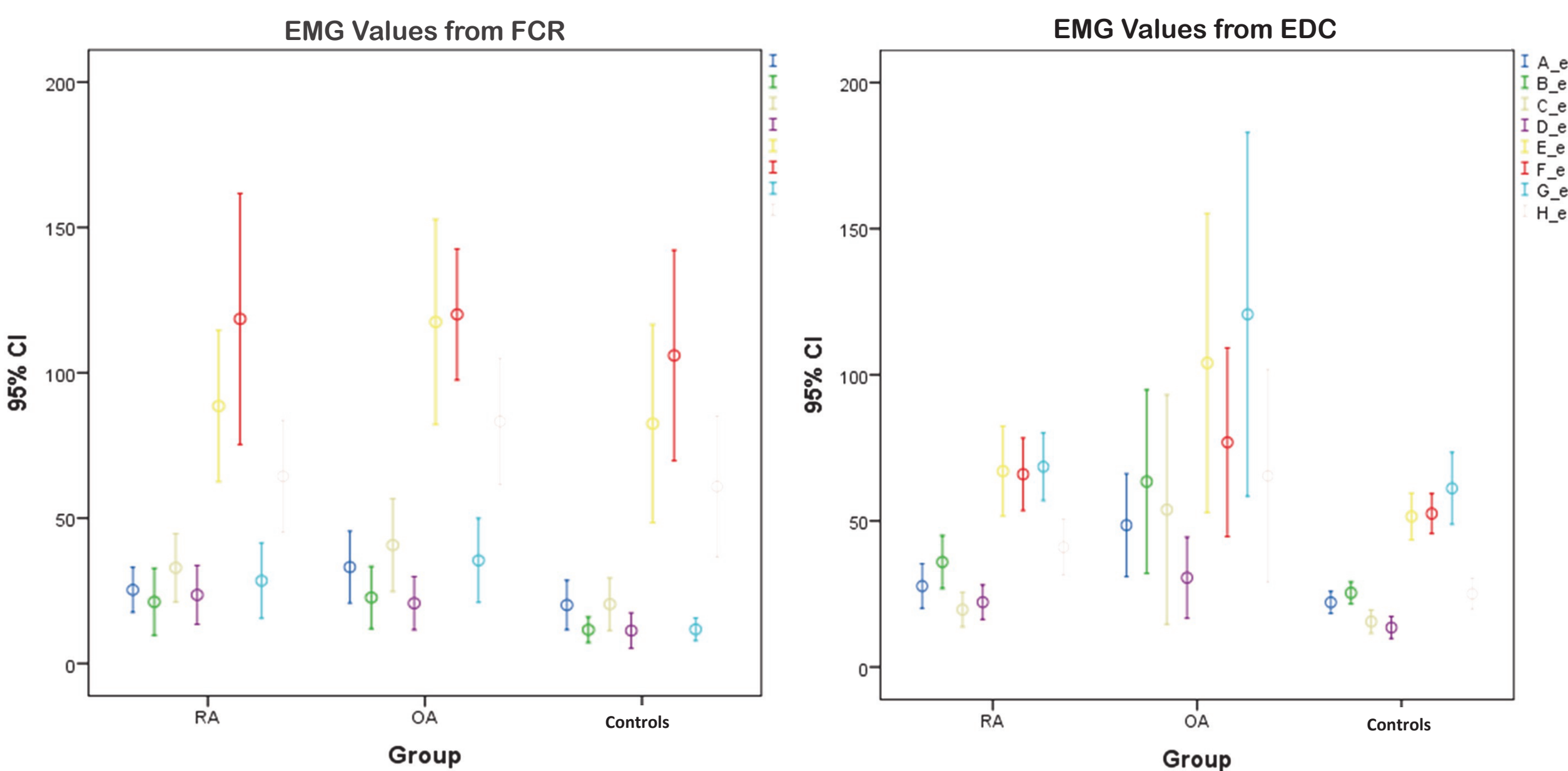
METHODS

Twenty women with RA, 16 with HOA and 20 healthy women were consecutively included. The age matched healthy group had no history of hand/arm injuries, inflammatory or muscle disease. Full active finger extension was required for all subjects.

Grip force (N) was measured with EX-it (extension) and Grippit (flexion). Muscle activity was measured with surface EMG (maximal voluntary isometric contraction, % MVIC) in musculus extensor digitorum communis (EDC) and musculus flexor carpi radialis (FCR) on the dominant hand while performing four daily activities (DA, picture A-D) and four hand exercises. (E-H). Pain was measured with VAS, 0-10 (best to worst). Hand activities were evaluated with the patient reported Quick Disabilities of the Arm Shoulder and Hand (DASH) Questionnaire. Results are presented as mean and 95% CI.

RESULTS

- The activities “writing with a pen ” (A), and “cutting with scissors “ (C) had the highest % MVIC in both EDC and FCR in all groups.
- The exercise “finger extension ” (G) had the highest % MVIC in EDC, while “isolated opposition ” (E), and “squeezing the dough ” (F), had high % MVIC in both the EDC and FCR.



- Women with RA and HOA had decreased extension and flexion force compared with healthy women (p<0.03).
- There was a tendency towards higher % MVIC in all tests for women with RA or HOA compared with healthy women, with a statistically significant difference between HOA and healthy women for EDC (p<0.05).

CONCLUSIONS

Women with RA and HOA tended to use a higher % MVIC than healthy women in many daily activities which were most evident in measures of extensor muscle activity.

We recommend that strengthening exercises include both extensor and flexor specific training.

In a hand exercise program, “isolated opposition” and “squeezing the dough” will strengthen both flexors and extensor muscles of the hand while “finger extension” has its focus on strenghtening extensor muscles.

Table. Patient descriptive at baseline, data presented as mean (95% CI) or percentage (%)

	RA (n=20)	HOA (n=16)	Healthy (n=20)
Age (years)	59.5 (54-64)	68.1 (62-72)	56.0 (51-60)
Disease duration (years)	20.0 (15.1-28.2)	15.0 (11.5-20.3)	na
Medication (%)	100	41	na
Work (%)	35	29	70
Quick DASH	40.9 (33.2-50.7)	31.8 (30.8-45.2)	2.3 (0.9-10.5)
VAS pain	2.0 (1.5-3.0)	3.9 (3.1-5.0)	na
Extension force Max, N	20.0 (17.8-26.1)	26.0 (21.4-31.5)	33.5 (30.6-39.3)
Mean, N	18.0 (15.0-20.5)	21.5 (17.4-24.8)	23.0 (21.5-29.6)
Flexion force Max, N	81.0 (67.4-137.4)	81.5 (70.8-125.8)	245.0 (195.3-275.6)
Mean, N	38.0 (32.7-98.2)	24.0 (22.0-34.0)	198.0 (158.4-234.4)