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Murray, Mike; Lange, Britt; Andersen, Christoffer Højnicke; Sjøgaard, Gisela

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Exercise training as treatment of neck pain among fighter pilots.

Murray M, 1, Lange B, 1,2, Andersen HC,1, Sjøgaard G, 1

1Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense C, Denmark. 2Department of Anesthesia and Intensive Care Medicine, Odense University Hospital, Sdr. Boulevard 29, 5000 Odense C, Denmark.

Introduction
Neck and shoulder pain is a common complaint among fighter pilots and a growing aero-medical concern. Unfortunately, previous intervention studies have been unsuccessful in relieving such pain within this occupational group. The aim of this study was to investigate if an exercise intervention could reduce the high prevalence of neck pain among fighter pilots.

Methods
F-16 pilots were randomized in a controlled intervention trial, to either an exercise-training-group (ET, n=27) or reference-group (REF, n=28). ET underwent 24 weeks of strength, endurance, and coordination training, 3 times a week, targeting deep and superficial neck muscles (see: www.sdu.dk/f16pilots). REF received no training but was scheduled for corresponding training 6 months later. Main outcome: Three months prevalence of neck pain assessed on a ten point visual analog scale, VAS (0 corresponded to “no pain” and 10 to “pain at worst”). Compliance was evaluated by training diary as mean training sessions completed per week, and by questionnaire on a six-step scale, 1) regular, 2-3 times a week, 2) less regular, 1-2 times a week, 3) irregular, but > 4 times a month, 4) very irregular, 2-3 times a month, 5) seldom, trained but stopped, 6) no participation at all. Maximal Voluntary Isometric Contraction (MVC) and Rate of Force Development (RFD) for cervical flexion and extension were measured by strain-gauge transducers.

Results
Prevalence of neck pain was significantly reduced in ET from baseline (mean ± SD) 2.0 ± 0.4 to follow-up 1.0 ± 0.2, change -1.0 ± 0.4 (P = 0.01), but not in REF from 2.1 ± 0.4 to 2.3 ± 0.4 (P = 0.80). Comparison between groups found the reduction significant (P = 0.01). Compliance for ET according to the training diary was 1.9 ± 0.6 times per week, and according to questionnaire 58% participated more that once a week (scale 1+2). Compliance according to the questionnaire correlated with registrations in the training diary (r = -0.745, P = < 0.000). MVC measures for cervical flexion and extension at baseline in ET were 183.6 N ± 47.1 and 286.5 N ± 48.0, and in REF 160.7 N ± 51.4 and 265.2 N ± 60.8, respectively. No significant differences were found between groups at follow-up for cervical flexion or extension. RFD for cervical-flexion increased significantly in ET from 866.6 N/s ± 263.5 at baseline to 968.9 N/s ± 295.9 at follow-up (P = 0.04), but not in the REF group, from 807.0 N/s ± 286.2 to 867.8 N/s ± 274.3 (P = 0.33). No difference was found between groups at follow-up.

Discussion
The exercise intervention reduced neck pain among F-16 pilots with a modest effect size. Compliance according to the questionnaire correlated well with participation based on the training diary, but only 58% of the training group trained regularly once or more a week. Higher compliance may be requested to attain strength gain and larger effect size. The intervention incorporated deep neck muscle training, which may be an important factor in the success of the training regime.