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DOES GROUP GYMNASTICS AT THE WORKPLACE HELP IN NECK PAIN?

A controlled study

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ABSTRACT. The effects of group gymnastics on neck pain were studied among 44 women in a printing company. A randomized cross-over design was used with two groups matched according to the work task, frequency of symptoms, and age. The treatment consisted of gymnastics for 45 min once a week for 10 weeks. Neck pain was rated by visual analogue scale and pressure pain sensitivity of the neck muscles was measured with an algometer. The results showed no clear effects of the group gymnastics program. An equal and significant reduction in pain ratings was seen in both groups after the first intervention in the spring. Recurrence of symptoms was seen in both groups in September, and no significant reduction in pain occurred during the second intervention in the autumn. The results suggest a seasonal variation in neck symptoms which has to be considered when planning or evaluating intervention studies.

Key words: controlled clinical trial, cervico-brachial disorders, tension neck, exercise, biological rhythms, intervention studies, musculoskeletal disorders, occupational disease.

Neck pain is a common symptom among workers in several occupations. Treatment has varied from medications and traditional means of physical therapy to pause gymnastics and resting pauses or ergonomic changes in work. Few studies exist on the effects of different treatments of neck symptoms at work (3). Neck school has proved to have only limited value in controlling neck symptoms, despite its popularity (2). In a trial of physiotherapy with psychosomatic approach and ergonomic instructions as compared with ergonomic instructions only, both treatments resulted in only slight reduction of neck pain among dentists (7).

During recent years, active fitness programs have been introduced to replace passive physiotherapeutic methods. In a study among 54 women in office work, Dyrssen et al. (1) described good results of muscle training three times a week for 3 months in favor of gymnastics once a week. Kilpikari et al. (4) had also good experiences of dynamic muscle training among industrial workers. A trial among workers in assembly and packing tasks failed to show clear differences in neck/shoulder discomfort scores between the women who participated and those who did not in an exercise program (7 min twice per shift) (8). Neither did Kukkonen et al. (5) see any reduction of symptoms after muscle training or bio-feedback training in a controlled study among hospital workers.

Dynamic group gymnastics once or twice a week have proved popular in recent years and it has been claimed to alleviate musculoskeletal pain and other symptoms. The aim of the present study was to investigate whether this kind of group training at the workplace is effective in alleviating neck pain and disability.

SUBJECTS AND METHODS

The study was performed in a security printing company with 330 workers. Forty-five women (age 20–55 years) with frequent neck symptoms gave their consent to the study. In a clinical examination none of them had signs of cervical nerve root compression or tendinitis of the shoulder. All subjects had light sedentary tasks, consisting of some repetitive hand and arm movements, but the force demand and loads to be handled were low (usually less than 0.1 kg). All workers had some tasks demanding attention, e.g. checking or counting.

Study design

The subjects were matched according to work tasks, frequency of neck pain during the past month, and age, and randomly allocated into two groups (A and B). A cross-over design was utilized so that group A was the treatment group and group B the control group in the spring. In the autumn the groups were reversed. The measurements were performed before the first intervention in March 1990, after the first intervention in May 1990, before the second intervention in September 1990, and after the second intervention in January 1991.

Table I. *Age, pressure pain threshold (PPT, mean of eight neck muscles), and pain rating on visual analogue scale (VAS) of the subjects prior to the first intervention (medians, lower (Q1) and upper (Q3) quartiles).*

Group	n	Age (years)		PPT (N)		VAS (mm)	
		median	Q1–Q3	median	Q1–Q3	median	Q1–Q3
A	22	43	38–49	45.2	37.5–53.1	40	18–66
B	22	45	34–51	44.8	32.8–54.8	50	16–66

One woman of group A did not participate in the treatment; therefore both groups consisted of 22 women in the spring. Two subjects did not participate in the treatment in the autumn and data were missing on 13 subjects. Therefore the number of subjects in the second intervention was 13 in treatment group B and 17 in control group A.

Outcome variables

The subjects rated their neck pain and disability during the past 7 days on 100 mm long visual analogue scales (VAS) (12). The anatomical region of the neck was defined with a sketch to comprise the neck, scapular and interscapular area.

Pressure pain threshold (PPT) was measured bilaterally on four muscles (upper trapezius, levator scapulae, rhomboideus, infraspinatus) (9, 10) and the mean values of the measurements of these eight points represented pressure pain sensitivity in the neck region. Because the subjective pain can be related even to only one of the eight points without general tenderness, the lowest value in addition to the mean values of the eight pressure points was calculated. The sternal manubrium served as a reference point. The rater was blinded with respect to the group status (treatment or control) of the subject. Pressure pain was measured only before and after the first intervention in March and May.

Table I shows the characteristics of the subjects at the beginning of the study.

Intervention

The subjects participated in group gymnastics during working hours, performed for 45 min once a week for 10 weeks. The exercises were planned to train the whole body. Each session consisted of periods of aerobic dynamic exercises, relaxation, and stretching of the muscles of the trunk and extremities. The schedule of the session was the following: 10 min walking or stepping, 10 min stretching and dynamic exercises, 5 min walking or stepping, 10 min dynamic and coordination exercises, and 10 min stretching and relaxation. The mean participation rate was eight of ten sessions both in the spring (range 6 to 10) and in the autumn (range 4 to 10).

Data analysis

The hypothesis was that there is an increase in pressure pain sensitivity and a reduction in rated pain after the treatment. Because many of the data distributions were skewed, Wilcoxon signed ranks test (one-sided) was used to test the differences between pre- and post-treatment values. Differences in the change of the ratings between the groups were tested with Wilcoxon-Mann-Whitney test. Differences between the groups in disability ratings (VAS) were tested only when the pre-treatment distributions were comparable. p-values of 0.05 or less were regarded as statistically significant.

RESULTS

A slight increase in the mean pressure pain threshold was seen in both groups after the first intervention (median increase 4.0 N for group A and 3.3 N for group B), and for the treatment group this difference was statistically significant ($p=0.008$). The lowest values of the muscles or the values on the sternal manubrium showed no statistically significant change in either group.

During spring from March to May treatment group A showed a median decrease of 9 mm (interquartile range −3 to 21 mm, $p=0.042$) in the pain ratings by VAS (Fig. 1). A similar decrease was seen in the pain ratings of the control group B (median 8 mm, interquartile range −2 to 35 mm, $p=0.008$). In most items of disability due to neck pain, a statistically significant reduction was seen in both groups after the intervention. Two items showed a greater reduction in the treatment than in the control group: overall handicap (median reduction 11 vs. 3 mm; $p=0.036$, Wilcoxon-Mann-Whitney, one-sided) and interference with work (median reduction 18 vs. 2 mm; $p=0.035$).

Pain ratings (VAS) increased from May to September in both groups (Fig. 1). Although some subjects dropped out, groups A and B were still comparable with respect to age and work tasks, but the variation of pain ratings (VAS) was greater in group A. After the second treatment in the autumn a slight but not statistically significant change in pain ratings was seen in the treatment group B (median decrease 2 mm, interquartile range −7 to 34 mm). The median change for group A was 0 mm.

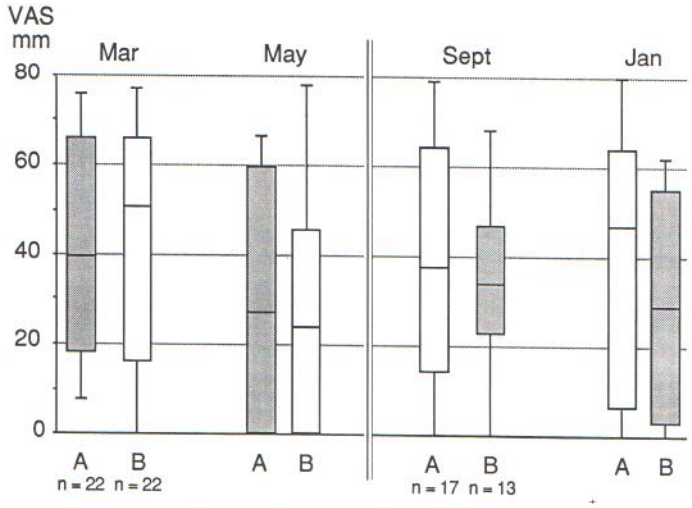

Fig. 1. Pain ratings by visual analogue scale (VAS, mm). Shadowed boxes denote the treatment group and white ones the control group. Boxes and whiskers show the 10, 25, 50, 75 and 90th percentiles.

DISCUSSION

The results showed only a slight if any short term effect of group gymnastics on neck pain and disability and pressure pain sensitivity. If the decrease in symptoms seen in the treatment group in the spring was an effect of better muscle function due to the training, it would be natural that the effect did not remain after cessation of the training. The exercises in our study were fairly light, so there was hardly any notable improvement in muscular performance. In another study with more vigorous exercises, no long term effects were seen either (5). Levoska & Keinänen-Kiukaanniemi (6) compared active fitness training with passive physiotherapy among female office employees. In their study an equal reduction of neck pain was seen in both groups but after 3 and 12 months the symptoms had recurred.

The reasons for poor results in intervention studies of work-related neck symptoms may be twofold: First, it is possible that the maneuvres have a poor effect. The second reason is the difficulty in selecting subjects with similarly severe neck pathology for control and intervention groups. The outcome variables in most studies (also in our study) have been based on the ratings of subjective symptoms. No golden standard for the classification of common neck disorders exists, and therefore the subjects may have different pathological stages behind similar symptoms.

A reduction in pain intensity was seen in both groups in the spring. This result is in accordance with our former finding of a seasonal variation of neck pain in an epidemiologic study among female bank tellers (11).

Our results suggest that no major effects on neck pain are seen after group gymnastics performed once a week. The seasonal variation in neck symptoms has to be considered in the planning of interventions and the interpretation of their results.

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