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Effectiveness of dynamic muscle training, relaxation training, or ordinary activity for chronic neck pain: randomised controlled trial

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This is an abridged version; the full version is on bmj.com

Abstract

Objective To determine the effectiveness of dynamic muscle training and relaxation training for chronic neck pain.

Design Randomised controlled trial.

Setting Five occupational healthcare centres, Tampere, Finland.

Participants 393 female office workers (mean age 45 years) with chronic non-specific neck pain randomly assigned to 12 weeks of dynamic muscle training (n = 135) or relaxation training (n = 128), plus one week of reinforcement training six months after baseline; or ordinary activity (control group; n = 130).

Main outcome measure Change in intensity of neck pain at three, six, and 12 months.

Results No significant difference was found in neck pain between the groups at follow up. However, the range of motion for cervical rotation and lateral flexion increased more in the training groups than in the control group.

Conclusions Dynamic muscle training and relaxation training do not lead to better improvements in neck pain compared with ordinary activity.

Introduction

Neck pain is common, especially among women, and around 67% of adults will have neck pain sometime during their life.^{1,2} The underlying pathology of neck disorders remains unclear, so treatments are aimed at pain relief. Dynamic muscle training and relaxation training are often prescribed for chronic neck pain despite a lack of evidence on their effectiveness.³⁻¹⁰ We aimed to assess the effects and costs of dynamic muscle training and relaxation training for chronic neck pain in female office workers.

Participants and methods

The catchment population comprised female office workers whose employers had a contract with one of the large occupational healthcare centres in Tampere, Finland. Eligible women were those aged 30-60 years who had had chronic non-specific neck pain for at least 12 weeks. Participants were recruited by occupational health physicians from February 1996 to March 1998.

Baseline data included potential confounders, effect modifying factors, and factors related to neck disorders. Participants were examined by MV and a physiotherapist at the Tampere Regional Institute of Occupational Health. The physiotherapist measured the cervical range of motion (rotation, lateral flexion, flexion and extension) and the dynamic muscle strength of the neck and shoulder region. Participants agreed not to tell the research staff or occupational health staff their particular intervention.

Randomisation and treatments

A research assistant randomised participants to either dynamic muscle training, relaxation training, or ordinary activity (control group). Treatment allocation was concealed in a numbered opaque envelope, which was opened by the physician after baseline measurements had been taken and the participants had completed a questionnaire. To ensure internal validity one physiotherapist performed all the measurements blinded to treatment allocation at baseline and follow up. It was not possible to blind the patients.

Both intervention groups were instructed and trained by a physiotherapist three times a week for 30 minutes each over 12 weeks, followed by one week of reinforcement training six months after randomisation. Training was conducted by experienced physiotherapists in groups of up to 10 people.

Dumbbells were used for dynamic muscle training. The exercises, conducted in the same order in each

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session, were chosen to activate large muscle groups in the neck and shoulder region.^{11 12} Relaxation training comprised various techniques based on the progressive relaxation method, autogenic training, functional relaxation, and systematic desensitisation.¹³ The exercises aimed to teach the participants to activate only those muscles needed for different daily activities and to relax the other muscles. MV instructed the women in the control group not to change their physical activity or means of relaxation during the 12 months of follow up.

Adherence, cointerventions, and outcome measures

The instructors recorded the number of exercises and relaxation sessions undertaken during the intervention period. At follow up, the participants completed questionnaires on the number of weekly exercise or relaxation training sessions undertaken independently, the duration of each session, the number of weeks these were performed, and whether they had received additional health care.

The primary outcome measure was intensity of neck pain. Other outcomes included neck disability, subjective work ability, cervical range of motion, dynamic muscle strength, sick leave owing to neck pain, and proportion of participants who recovered. Participants gave a general rating of their pain on a scale of 0 (no pain) to 10 (unbearable pain). A more detailed assessment of pain and disability was obtained from the responses to eight questions: How intense is your neck pain? How intense is your neck pain during the night? How stiff is your neck? Does neck pain hinder you from looking up? Does neck pain hinder you from turning your head sideways? Does neck pain hinder you from working with your arms over the shoulder level? How much does neck pain limit your everyday living? and How much does neck pain limit your work? Responses were rated on a scale of 0 (no pain or hindrance) to 10 (unbearable pain or maximum hindrance). The scores were summed (scale 0-80) to form a neck disability index. The cervical range of motion was measured in three planes with an inclinometer.¹⁴ To assess subjective recovery, participants were asked how their neck pain compared with its status six and 12 months earlier.

Depression was rated with an index developed for primary care, comprising 10 questions on a scale of 1 to 4 (total score 10-40); higher scores denote greater depression.¹⁵ Work stress was rated by 12 questions on a scale of 1 to 5 (total score 12-60); higher scores denote greater work stress.¹⁶

Follow up examinations were undertaken at three, six, and 12 months after baseline. At these visits participants completed a questionnaire on the use and costs of healthcare services and drugs taken for neck disorders.

Statistical analysis

Our main outcome measure was change in intensity of neck pain from baseline to follow up at three, six, and 12 months.

We calculated the differences in the change in all outcome variables between the intervention groups and control group.¹⁷ A clinically significant difference in pain intensity between the groups was considered to be 1.0 (SD 2.0). Efficacy variables were analysed on an

intention to treat basis. For full details of the analysis, see bmj.com.

Results

Overall, 393 women were randomised: 135 to dynamic muscle training, 128 to relaxation training, and 130 to ordinary activity (control group). Follow up information was obtained for 91% (n = 357) of participants at three months, 89% (n = 349) at six months, and 87% (n = 340) at 12 months.

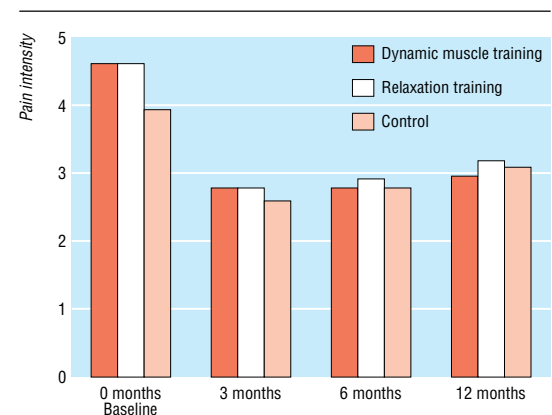
The three groups were similar for most baseline characteristics (see bmj.com). Neck pain lasted an average of 10.5 years, with an intensity of 4.7. Dropouts did not differ from the remaining participants or between the three groups.

Adherence, cointerventions, and outcomes

On average the number of guided 30 minute training sessions completed by patients over the 12 weeks was 13.6 (39% of maximum) in the dynamic muscle training group, 14.6 (42% of maximum) in the relaxation training group, and zero in the control group. At 12 months the average number of minutes a week spent on intervention specific exercise was 31 in the dynamic muscle training group, 20 in the relaxation training group, and 0 in the control group.

No significant differences were found at any of the follow up examinations between the two training groups and the control group for changes in pain intensity, neck disability, subjective work ability, range of motion for cervical flexion and extension, or dynamic muscle strength (figure). The range of motion for cervical rotation and lateral flexion increased slightly more in the training groups than in the control group. No significant differences were found between the training groups in any of the other outcome variables.

Details of the outcome measures at three, six, and 12 months are on bmj.com. No significant differences were found in sick leave owing to neck pain between the three groups. The mean (SD) number of days on sick leave over 12 months was 3.7 (16.5) in the dynamic muscle training group, 2.3 (8.1) in the relaxation training group, and 2.0 (8.4) in the control group. The proportion of participants who had been on sick leave was 15% (n = 20) in the dynamic muscle training group,



Intensity of neck pain at baseline and follow up after dynamic muscle training, relaxation training, or ordinary activity

18% (n = 23) in the relaxation training group, and 15% (n = 20) in the control group. At six months the proportion of participants who thought that their neck had fully or considerably recovered was 53% (n = 72) in the dynamic muscle training group, 23% (n = 30) in the relaxation group, and 17% (n = 22) in the control group compared with 26% (n = 35), 23% (n = 30), and 12% (n = 16), respectively, at 12 months.

Discussion

Dynamic muscle training or relaxation training for chronic neck pain in female office workers had no effect on the intensity of pain, neck disability, or sick leave over 12 months. The training groups reported better subjective recovery than the control group, and there was a slight improvement in the cervical range of motion, but this was not clinically relevant.

Systematic reviews of conservative treatments for neck pain have looked at only a few randomised clinical trials on dynamic muscle exercises and none on relaxation exercises. None of the studies included the dynamic exercises we used. The methods most similar to ours were group instructional strategies with light gymnastics or stretching, which did not reduce pain when compared with no treatment.^{3-5, 9} In one study, individual proprioceptive exercises, relaxation, and behavioural support produced an alleviation of neck pain at three months but not at 12 months.¹⁸ High intensity exercise has not been found more effective than low intensity exercise for chronic neck pain.¹⁹ Our training comprised dynamic exercises for large muscle groups using dumbbells followed by stretching of the exercised muscles, and the intensity of the exercises was increased progressively during the training programme. Studies assessing the effectiveness of muscle strengthening exercises have also had small sample sizes and weak methods.⁷⁻⁹

The large number of patients in our study led to both good comparability between the treatment groups and strong statistical power. Minor imbalances in characteristics at baseline were controlled for in the analyses. Adherence during the first three months was not complete, but the attendance rate was probably at least as good as in clinical practice. The amount and content of the interventions also complied with current practice.

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Competing interests: None declared.

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What is already known on this topic

Dynamic muscle training and relaxation training are often prescribed for chronic neck pain

Reliable data on the effectiveness of these interventions compared with ordinary activity are lacking

What this study adds

Dynamic muscle training and relaxation training do not have more favourable effects on chronic neck pain over advising patients to be active

Ordinary activity leads to an outcome similar to that of dynamic muscle training or muscle relaxation training

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Endpiece

A warning

Don't scrape your insides with much roughage as it is more likely to do harm than good. Vegetarianism is harmless enough though it is apt to fill a man with wind and self-righteousness.

Sir Robert Hutchison (1871-1960) in an address to the BMA in Winnipeg, Canada, 1930

Fred Charatan, retired geriatric physician, Florida