Manual Therapy 24 (2016) 25–45

Contents lists available at ScienceDirect

Manual Therapy

journal homepage: www.elsevier.com/math

Review article

Exercises for mechanical neck disorders: A Cochrane review update

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ARTICLE INFO

Article history:
Received 12 April 2016
Accepted 13 April 2016

Keywords:
Cochrane review
Meta-analysis
Neck pain
Exercise

ABSTRACT

Background: Neck pain (NP) is disabling and costly.
Objectives: To assess the effectiveness of exercise on pain, disability, function, patient satisfaction, quality of life (QoL) and global perceived effect (GPE) in adults with NP.
Methods: We searched computerised databases up to May 2014 for randomized controlled trials (RCTs) comparing exercise to a control in adults with NP with/without cervicogenic headache (CGH) or radiculopathy. Two reviewers independently conducted selection, data abstraction and assessed risk of bias. Meta-analyses were performed to establish pooled standardised mean differences (SMDp). The Grade of Recommendation, Assessment, Development and Evaluation (GRADE) was used to summarise the body of evidence.
Main Results: The following exercises (27 trials) were supported by 'Moderate GRADE' evidence:
For chronic NP, 1) cervico-scapulothoracic and upper extremity (UE) strengthening for moderate to large pain reduction immediately post treatment (IP) and at short-term (ST) follow-up; 2) scapulothoracic and UE endurance training for a small pain reduction (IP/ST); 3) cervical, shoulder and scapulothoracic strengthening and stretching exercise for a small to large pain reduction in the long-term (LT) (SMDp −0.45 [95%CI: −0.72 to −0.18]) and function improvement; 4) cervico-scapulothoracic strengthening/stabilisation exercises for pain and function at intermediate-term (IT) (SMDp −14.90 [95%CI: −22.40 to −7.39]). 5) mindfulness exercises (Qigong) for minor improved function but not GPE (ST).
For chronic CGH, cervico-scapulothoracic strengthening and endurance exercises including pressure biofeedback for small/moderate improvement of pain, function and GPE (IP/LT).
Authors' conclusions: Specific strengthening exercises of the neck, scapulothoracic and shoulder for chronic NP and chronic CGH are beneficial. Future research should explore optimal dosage.

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http://dx.doi.org/10.1016/j.math.2016.04.005
1356-689X/

1. Background

1.1. Description of the condition

Neck disorders are common (Hogg-Johnson et al., 2008; Hoy et al., 2014), painful, and limit function in the general population (Carroll et al., 2008; Haldeman et al., 2010). The global point prevalence of neck pain was estimated to be 4.9% in 2010 (Hoy et al., 2014).

1.2. Description of the intervention

We adopted the Therapeutic Exercise Intervention Model to sub-classify exercise (Sahrmann, 2002). Hall and Brody (2005) intersects this model with two other axes – activity and dosage (See Table 1).

1.3. How the intervention might work

Exercise has both physical and mental benefits through its effects on numerous systems such as the cardiovascular, immune, neurologic, and musculoskeletal systems (Abernethy et al., 2013). Central to these benefits are the stages of change, encompassing the health belief and cognitive behaviour models.

1.4. Why it is important to do this review

In our last Cochrane update on exercise therapy, we found low to moderate quality evidence of pain relief benefits for combined cervical, scapulothoracic stretching and strengthening for chronic neck pain in the short and long-term. Since then, five other reviews have found primarily very low to low GRADE evidence, as well as low GRADE evidence for no beneficial effect on pain (Table 2). A number of these reviews included studies that were not clearly categorised. Therefore, the true impact of exercise alone could not be determined with strong evidence.

1.5. Objectives

To present an abbreviated report of a Cochrane systematic review that assessed the immediate to long-term effect of exercise therapy on pain, function/disability, patient satisfaction, quality of life (QoL), and global perceived effect (GPE) in adults experiencing mechanical neck pain with or without cervicogenic headache or radiculopathy.

2. Methods

This is an abbreviated co-publication of our Cochrane systematic review update (Kay et al., 2015). See Table 3 for selection criteria and the primary review for full details. A protocol was previous0ly published (Issue 2, 2003 Cochrane Library).

2.1. Search methods for identification of studies

A research librarian searched computerised bibliographic databases for medical, chiropractic and allied health literature. Electronic searches included databases from their start to May 2014 (See Fig. 1 and Gross et al., 2015 for greater details). See Appendix 1 for Characteristics of Included Studies.

2.2. Measures of treatment effect

For continuous data, standard mean difference (SMD) with 95% confidence intervals (CI) was calculated. The minimal clinically important difference (MCID) for pain was 10 on a 100-point pain intensity scale (Goldsmith et al., 1993; Felson et al., 1995; Farrar et al., 2001). We considered the effect small when it was less

Table 1
The Therapeutic Exercise Intervention Model to sub-classify exercise (Sahrmann, 2002) is foundational to classification of exercise in this systematic review.

Support element:
An exercise categorised under this element would affect the functional status of the cardiac, pulmonary and metabolic systems (e.g. **aerobic** endurance activities).
Base Element:
Exercises categorised under base would affect the functional status of the muscular and skeletal systems and is commonly linked to the biomechanical element. This element provides the basis for movement as follows:

- **extensibility**/stiffness properties of muscle, fascia and periarticular tissues for range of motion and stretching exercises,
- **mobility** of neuromeningeal tissue for neural mobilisation exercises,
- force or torque capability of muscles and the related muscle length–tension properties for **strengthening** exercises, and **endurance** of muscle also involved in strengthening for endurance-strength training.

Modulator Element:
Exercises under this element relate to motor control for neuromuscular re-education as follows:

- **patterns and synchronisation** of muscle recruitment, and
- feed forward or feedback systems using verbal, visual, tactile and other **proprioceptive inputs** to the patient.

Biomechanical Element:
This element is an interface between the motor control associated with the modulator element and musculoskeletal function associated with the base element. Components of the biomechanical element include:

- **static stabilisation** forces involved in alignment and muscle recruitment, and
- **dynamic stabilisation** forces involved in arthrokinetics, osteokinetics and kinematics.

Cognitive or Affective Element:
Exercises in this category affects the functional status of the psychological system as it is related to movement as follows:

- the cognitive ability to learn,
- patient and caregiver compliance,
- motivation, and
- emotional status.