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## **PEDro Systematic Review Update**

This section features a recent systematic review which is indexed on PEDro, the Physiotherapy Evidence Database ([www.pedro.org.au](http://www.pedro.org.au)). PEDro is a free, web-based database of evidence relevant to physiotherapy.

Physiotherapy rehabilitation for whiplash associated disorder II: a systematic review and meta-analysis of randomised controlled trials

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**Contributorship** ZAM and MF selected the systematic review, interpreted the data, wrote the manuscript and are guarantors.

Rushton A, Wright C, Heneghan N, Eveleigh G, Calvert M, Freemantle N. Physiotherapy rehabilitation for whiplash associated disorder II: a systematic review and meta-analysis of randomised controlled trials. *BMJ Open* 2011; 1:e000265 doi:10.1136/bmjopen-2011-000265

### **Background**

Whiplash injuries occur due to an ‘acceleration–deceleration energy transfer to the neck’, usually as the result of a motor vehicle accident, although the injury may also occur while participating in sport e.g. diving. Clinically, whiplash injuries are graded 0 – IV (higher grade indicates increased severity) with the majority of patients (93.4%) classified as having a grade II injury (neck complaint e.g. pain, stiffness or tenderness AND musculoskeletal signs e.g. reduced range of motion) [1]. While grade II whiplash injuries are frequently managed with conservative treatment approaches, the effectiveness of specific physiotherapy interventions has not been investigated in isolation.

### **Aims**

The authors aimed to synthesise the best available evidence to determine the short (< 3 months) and long term (> 12 months) effectiveness of physiotherapy outpatient management of patients presenting

with grade II whiplash injury compared to either no intervention, placebo or other intervention e.g. advice/education by a general practitioner, cervical collar.

### **Searches and inclusion criteria**

Eight biomedical databases were searched from their inception until December 2010. Authors also searched selected internet/indexing sites, trial registers, key journals, reference lists, unpublished research (e.g. conference proceedings, published abstracts) and personal citation tracking for key authors in the field. Included were randomised controlled trials published in English that evaluated the effectiveness of physiotherapy outpatient management in patients aged >16 years who experienced a grade II whiplash injury (any duration). The Cochrane Risk of Bias tool was used to assess the methodological quality of the included studies.

### **Interventions**

Physiotherapy outpatient interventions were categorised as either active physiotherapy (characterised as a multimodal or progressive intervention e.g. motor control, endurance, strength, postural exercises) or specific physiotherapy (e.g. manipulation, kinesiotaping, magnetic therapy).

### **Main outcome measure**

The primary outcome measures reported were pain, disability (Neck Disability Index: 0-50, higher score indicative of greater disability) and range of motion.

### **Statistical methods**

Random effects meta-analysis was performed to pool the results of the included studies and generate a standardised mean effect size. Heterogeneity in treatment effects was evaluated through calculation of  $I^2$ .

### **Results**

Twenty one studies (n=2,126 participants) were included in the review. Of the 21 included trials, 20 were evaluated as having a high risk of bias and one as unclear. The mean age of participants ranged from 16 years to 70 years, injury duration ranged from 2 days to 15 years. Thirteen included trials enrolled acute/sub-acute patients and 8 trials enrolled chronic patients. Only five studies exclusively included patients with a grade II whiplash injury (271/2126) therefore the majority of the included

studies consisted of patients with a combination of whiplash classifications (Grade 0-III). Based on the comparability of interventions, timing of assessments and outcome measures only 12 studies (n=1,395 participants) could be included in the meta-analysis. All 12 studies reported on participants in the acute/sub-acute stage at short term follow up; no pooled analyses were possible for interventions in the chronic stage or at long term follow up.

*Short term outcome of an active physiotherapy versus standard intervention (e.g. general practitioner care) for patients with acute/subacute injury*

An active physiotherapy intervention was found to have small short term effects in reducing pain (-0.35, 95%CI -0.63 to -0.07) and improving range of motion for flexion/extension (0.39, 95%CI 0.04 to 0.74), side flexion (0.45, 95%CI 0.17 to 0.73) and rotation (0.68, 95%CI 0.38 to 0.99) compared with a standard intervention (e.g. collar, GP care). However, no short term benefits were found for total range of motion or disability.

*Short term outcome of specific physiotherapy intervention versus control for patients with acute/subacute injury*

Specific physiotherapy interventions were also found to lead to a small short term reduction in pain compared to control (-2.11, 95%CI -3.85 to -0.36, Figure 1). However, there was no evidence of a short term effect on range of motion (flexion, extension, side flexion, rotation). None of the included studies reported on the effect of specific physiotherapy interventions on disability.

### **Limitations/considerations**

Strengths of this review include the thorough search (including trial registries, unpublished research and personal citations) and the use of the Cochrane Risk of Bias Assessment tool to appraise the quality of included studies. However, as only articles published in English were eligible for inclusion there is the potential for language bias in the review.

The findings of this review should be interpreted with caution for a number of reasons. Firstly, the review aimed to evaluate the effectiveness of physiotherapy management for patients with a grade II whiplash injury, however the majority of included studies enrolled patients with different whiplash injury classifications and therefore the findings cannot be specifically applied to patients with a grade II whiplash injury only. Secondly, the review included studies that were assessed to have a high risk of

bias. This is a concern as studies of poor methodological quality are usually associated with exaggerated and biased treatment effects. Moreover, care should be taken when interpreting the pooled treatment effect of specific physiotherapy intervention versus control on pain. The significant degree of heterogeneity among the four pooled trials ( $I^2=98.1\%$ ) potentially resulted in the large confidence interval. Such high level of heterogeneity suggests that pooling may not have been appropriate and providing individual study findings may be more informative.

### **Clinical implications**

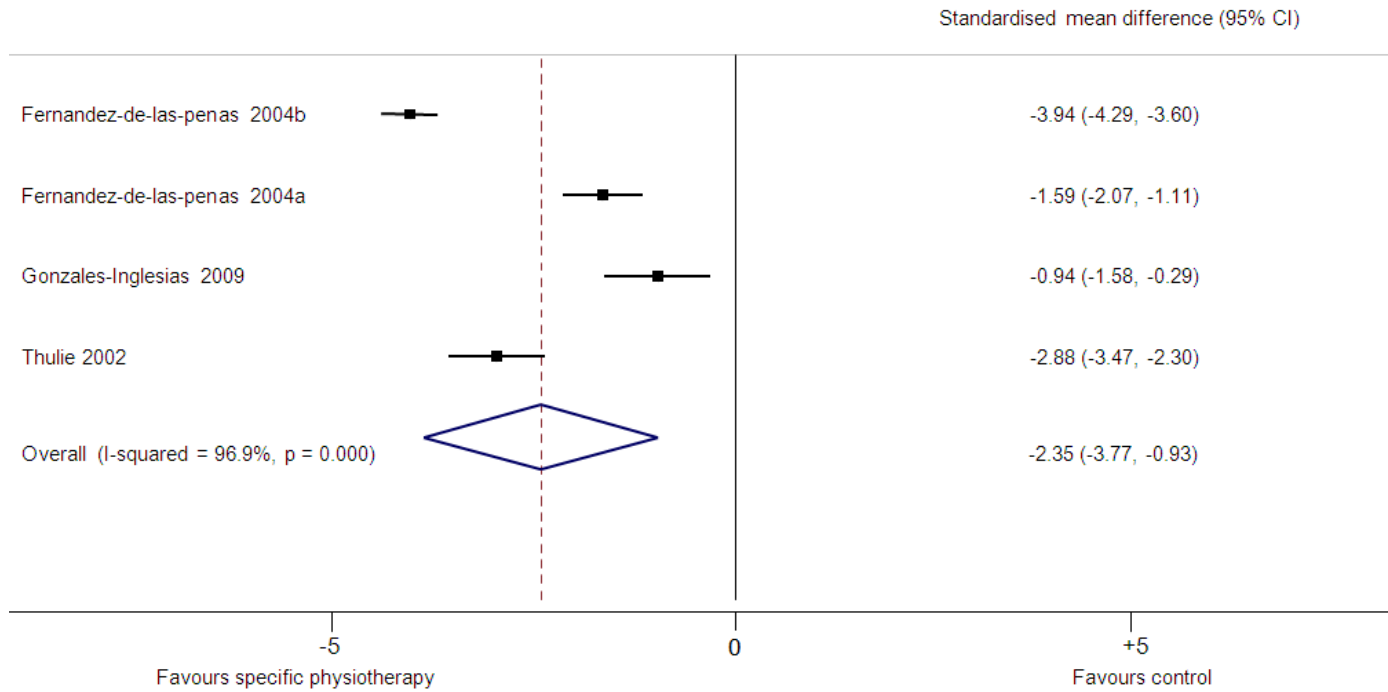
The role of physiotherapy interventions (active or specific) to manage patients with a grade II whiplash injury remains unclear. At best this review highlights the potential of these treatments to reduce pain and increased range of motion; however it also highlights the need for high quality studies to be conducted in patients with an acute and chronic whiplash injury in both the short and long term. With up to two thirds of patients with an acute whiplash injury developing chronic symptoms, the paucity of high quality research evaluating the effectiveness of conservative interventions is alarming.

**Competing interests** none.

**Provenance and peer review** commissioned; not externally peer reviewed.

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2. Fernandez-de-las-Penas C, et al. *J Whiplash & Relat Disord.* 2004a; 3:55.
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Figure 1: Pooled analysis for specific physiotherapy intervention verses control.



NB: this is a graphical representation of the pooled analysis recreated from original study data. The exact values reported in Rushton et al could not be replicated in this commentary.