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Evidence-Based Practice in Spinal Cord Injury: a narrative overview of Cochrane Systematic Reviews

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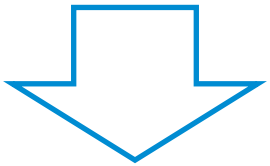
Spinal Cord Injury Evidence

- SCI is a high disabling injury
- it can lead to damage or loss of motor function and sensation, spasticity, pain and disturbed vegetative functions



Its complexity requests to be investigated deeply

Objective

To present Cochrane Evidence related to rehabilitation interventions of persons with SCI

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Methods

Cochrane Rehabilitation evidence database has been searched for Cochrane Systematic Reviews (CSRs) addressing rehabilitation of people with SCI published from inception to up to date. No specific search has been made regarding the intervention or the outcome addressed in the CSR.

Then, we checked them inside Cochrane Library

Search terms: “**spinal cord injury**” AND “**rehabilitation**”

Results

Cochrane Library

Search Term:

“Spinal Cord Injury”

Overall search results:
41 CSRs – 6 CPs

4 CSRs
(Pub years:
2013-up to date)

3 Rehab CPs
(Pub years:
2013-up to date)

Cochrane Library

Cochrane Database of Systematic Reviews

Pharmacological interventions for spasticity following spinal cord injury (Review)

Taricco M, Adone R, Pagliacci C, Telaro E 2000

Main results

Nine studies met the inclusion criteria. Study designs were: 8 cross-over and 1 parallel-group trial. Two studies (14 SCI patients), showed a significant effect of intrathecal baclofen in reducing spasticity (Ashworth Score and ADL performances), compared to placebo, without any adverse effects. The study comparing tizanidine to placebo (118 SCI patients) showed a significant effect of tizanidine in improving Ashworth Score but not in ADL performances. The tizanidine group reported significant rates of adverse effects (drowsiness, xerostomia). For the other drugs (gabapentin, clonidine, diazepam, amytal and oral baclofen) the results did not provide evidence for clinically significant effectiveness.

PLAIN LANGUAGE SUMMARY

Not enough evidence about the effects of drugs used to try and reduce spasticity in the limbs after spinal cord injury

A major problem after spinal cord injury is muscle resistance to having the arms or legs moved (spasticity). There can also be spasms. This can severely limit a person's mobility and independence, and can cause pain, muscle problems, and sleep difficulties. Treatments to try and reduce spasticity include exercise, and drugs to try and decrease the muscle tone. The review found there was not enough evidence from trials to assess the effects of the range of drugs used to try and relieve spasticity after spinal cord injury. The authors of the review call for more research and make recommendations as to how this research should be conducted.

Locomotor training for walking after spinal cord injury (Review)

Mehrholz J, Kugler J, Pohl M 2012

Main results

Five RCTs involving 309 people are included in this review. Overall, the results were inconclusive. There was no statistically significant superior effect of any locomotor training approach on walking function after SCI compared with any other kind of physical rehabilitation. The use of bodyweight supported treadmill training as locomotor training for people after SCI did not significantly increase walking velocity (0.03 m/sec with a 95% confidence interval (CI) -0.05 to 0.11; P = 0.52; I^2 = 22%) nor did it increase walking capacity (-1.3 metres (95% CI -41 to 40); P = 0.95; I^2 = 62%). However, in one study involving 74 people the group receiving robotic-assisted locomotor training had reduced walking capacity compared with people receiving any other intervention, a finding which needs further investigation. In all five studies there were no differences in adverse events or drop-outs between study groups.

Authors' conclusions

There is insufficient evidence from RCTs to conclude that any one locomotor training strategy improves walking function more than another for people with SCI. The effects especially of robotic-assisted locomotor training are not clear, therefore research in the form of large RCTs, particularly for robotic training, is needed. Specific questions about which type of locomotor training might be most effective in improving walking function for people with SCI need to be explored.

Respiratory muscle training for cervical spinal cord injury (Review)

Berlowitz DJ, Tamplin J

Main results

We included 11 studies with 212 participants with cervical SCI. The meta-analysis revealed a statistically significant effect of RMT for three outcomes: vital capacity (MD mean end point 0.4 L, 95% CI 0.12 to 0.69), maximal inspiratory pressure (MD mean end point 10.50 cm/H_2O, 95% CI 3.42 to 17.57), and maximal expiratory pressure (MD mean end point 10.31 cm/H_2O, 95% CI 2.80 to 17.82). There was no effect on forced expiratory volume in one second or dyspnoea. We could not combine the results from quality of life assessment tools from three studies for meta-analysis. Respiratory complication outcomes were infrequently reported and thus we could not include them in the meta-analysis. Instead, we described the results narratively. We identified no adverse effects as a result of RMT in cervical SCI.

Authors' conclusions

In spite of the relatively small number of studies included in this review, meta-analysis of the pooled data indicates that RMT is effective for increasing respiratory muscle strength and perhaps also lung volumes for people with cervical SCI. Further research is needed on functional outcomes following RMT, such as dyspnoea, cough efficacy, respiratory complications, hospital admissions, and quality of life. In addition, longer-term studies are needed to ascertain optimal dosage and determine any carryover effects of RMT on respiratory function, quality of life, respiratory morbidity, and mortality.

PLAIN LANGUAGE SUMMARY

Training the muscles used for breathing after a spinal cord injury

After an injury at a high point on the spinal cord (a cervical injury), the muscles responsible for breathing are paralysed or weakened. This weakness reduces the volume of the lungs (lung capacity), the ability to take a deep breath and cough, and puts them at greater risk of lung infection. Just like other muscles of the body, it is possible to train the breathing (respiratory) muscles to be stronger; however, it is not clear if such training is effective for people with a cervical spinal cord injury. This review compared any type of respiratory muscle training with standard care or sham treatments. We reviewed 11 studies (including 212 people with cervical spinal cord injury) and suggested that for people with cervical spinal cord injury there is a small beneficial effect of respiratory muscle training on lung volume and on the strength of the muscles used to take a breath in and to breathe air out and cough. No effect was seen on the maximum amount of air that can be pushed out in one breath, or shortness of breath. An insufficient number of studies had examined the effect of respiratory muscle training on the frequency of lung infections or quality of life, so we could not assess these outcomes in the review. We identified no adverse effects of training the breathing muscles for people with a cervical spinal cord injury.

Summary of findings for the main comparison. Respiratory muscle training compared with control for cervical spinal cord injury

Respiratory muscle training compared with control for cervical spinal cord injury

Patient or population: cervical spinal cord injury
Settings: hospital and community
Intervention: RMT
Comparison: control

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Control	RMT				
Dyspnoea Borg scale, modified Borg scale, and visual analogue scale Follow-up: 6-8 weeks		The mean dyspnoea in the intervention groups was **0.10 standard deviations lower** (1.65 lower to 1.44 higher)		58 (3 studies)	⊕⊕⊝⊝ **low**[1,2]	SMD -0.10 (-1.65 to 1.44))
Vital capacity Follow-up: 6-12 weeks	The mean vital capacity ranged across control groups from **1.4 to 2.7 L**	The mean vital capacity in the intervention groups was **0.40 higher** (0.12 to 0.69 higher)		108 (4 studies)	⊕⊕⊝⊝ **low**[1,2,3]	SMD 0.50 (0.11 to 0.89)
Maximum inspiratory pressure Follow-up: 6-12 weeks	The mean maximum inspiratory pressure ranged across control groups from **43 to 102 cm/H_2O**	The mean maximum inspiratory pressure in the		147 (8 studies)	⊕⊕⊝⊝ **low**[1,2]	SMD 0.44 (0.10 to 0.78)
Maximum expiratory pressure Follow-up: 6-12 weeks	The mean maximum expir sure ranged across control from **41 to 91 cm/H_2O**					
Forced expiratory volume in 1 second Follow-up: 6-12 weeks	The mean forced expiratory volume in 1 second ranged across control groups from **1.7 to 2.4 L**	The mean forced expiratory volume in 1 second in the intervention groups was **0.05 higher** (0.23 lower to 0.34 higher)		97 (4 studies)	⊕⊕⊝⊝ **low**[1,2,3]	SMD 0.08 (-0.33 to 0.49)
Quality of life Follow-up: 6-12 weeks	See comment	See comment	Not estimable	78 (4 studies)	⊕⊕⊝⊝ **low**[1,2,3]	
Respiratory complications Follow-up: 8 weeks	See comment	See comment	Not estimable	14 (1 study)	⊕⊕⊕⊕ **high**	

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: confidence interval; RMT: respiratory muscle training; SMD: standardised mean difference.

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] High risk of attrition bias.
[2] Inconsistency of results + small number of studies with small sample sizes.
[3] Blinding and allocation concealment unclear.

Non-pharmacological interventions for chronic pain in people with spinal cord injury (Review)

Boldt I, Eriks-Hoogland I, Brinkhof MWG, de Bie R, Joggi D, von Elm E

Main results

We identified 16 trials involving a total of 616 participants. Eight different types of interventions were studied. Eight trials investigated the effects of electrical brain stimulation (transcranial direct current stimulation (tDCS) and cranial electrotherapy stimulation (CES); five trials) or repetitive transcranial magnetic stimulation (rTMS; three trials). Interventions in the remaining studies included exercise programmes (three trials); acupuncture (two trials); self-hypnosis (one trial); transcutaneous electrical nerve stimulation (TENS) (one trial); and a cognitive behavioural programme (one trial). None of the included trials were considered to have low overall risk of bias. Twelve studies had high overall risk of bias, and in four studies risk of bias was unclear. The overall quality of the included studies was weak. Their validity was impaired by methodological weaknesses such as inappropriate choice of control groups. An additional search in November 2014 identified more recent studies that will be included in an update of this review.

Authors' conclusions

Evidence is insufficient to suggest that non-pharmacological treatments are effective in reducing chronic pain in people living with SCI. The benefits and harms of commonly used non-pharmacological pain treatments should be investigated in randomised controlled trials with adequate sample size and study methodology.

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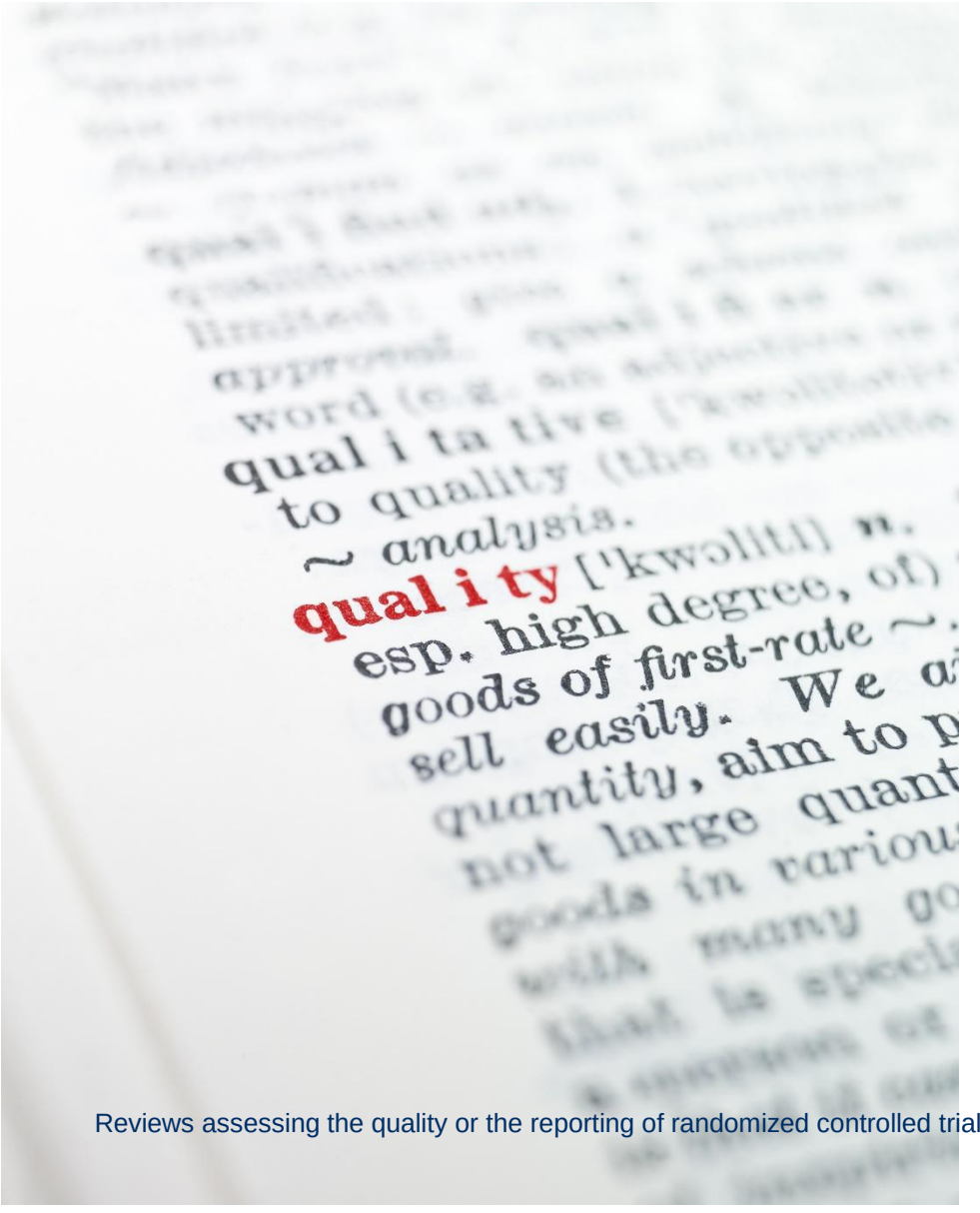

Quality of Evidence

Evaluating the methodological quality of trials is an essential component of SRs as only the best available evidence should inform clinical and policy decision

Reviews assessing the quality or the reporting of randomized controlled trials are increasing over time but raised questions about how quality is assessed.
Dechartres A, Charles P, Hopewell S, Ravaud P, Altman DG.
J Clin Epidemiol. 2011 Feb;64(2):136-44

Conclusion

The CSRs performed on rehabilitation related topics in persons with SCI are highly heterogeneous in terms of interventions and outcomes; not recently updated and few compared to other clinical conditions and most of them are inconclusive.

Better RCTs on spinal cord injury are needed

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"If you want to go fast, go alone, if you want to go far, go together". African proverb