A systematic review and meta-analysis of yoga for low back pain
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CRD summary
This review found strong evidence for short-term effectiveness and moderate evidence for long-term effectiveness of yoga for pain and disability associated with chronic low back pain. The authors’ conclusions reflect the results but the evidence was more compelling when compared to educational interventions and more uncertain when compared to exercise and to treatments offered under usual care.

Authors’ objectives
To assess the effectiveness of yoga in patients with low back pain

Searching
MEDLINE, EMBASE, The Cochrane Library, PsycINFO and CAMBASE were searched from inception to January 2012 with no language restrictions. Search terms were reported. Reference lists of identified articles and reviews were searched for further references.

Study selection
Eligible studies had to be randomised controlled trials (RCTs) published as a full paper. Eligible patients were adults (>18 years old) with low back pain regardless of cause, duration, intensity and radiation pattern. Studies could compare yoga to no treatment, usual care or any active treatment. Studies where yoga was not the main intervention but part of a multimodal intervention were excluded but studies could include a cointervention. Any type of yoga was eligible provided there was a physical component. Studies needed to assess at least one patient-centred outcome: pain, back-specific disability, quality of life, generic disability and global improvement. Safety outcomes were included as a secondary outcome where available.

Most of the trials took place in USA and there were two in each of UK and India. Nine of the 10 trials included only patients with chronic low back pain. Mean ages ranged from 44 to 48 years. Between 45% and 83% of patients in each trial were male. Various types of yoga were used. Programme length and intensity varied from daily interventions over one week to two interventions over 24 weeks. Control groups varied but most compared yoga to some form of education. Outcomes were measured with various instruments.

The authors did not state how many reviewers selected studies for the review.

Assessment of study quality
Risk of bias was assessed by two reviewers independently using the 12 criteria recommended by the Cochrane Back Review Group for selection bias, performance bias, attrition bias, reporting bias and detection bias. Disagreements were checked with a third reviewer and resolved by discussion. Trial authors were contacted where necessary. Trials that met at least six criteria and had no serious flaw were rated as having low risk of bias; studies that met fewer than six criteria or had a serious flaw were deemed to be at high risk of bias.

Data extraction
For continuous outcomes, standardised mean differences with associated 95% confidence intervals were calculated. For dichotomous outcomes, risk ratios with 95% confidence intervals were calculated.

Two reviewers independently extracted data. Discrepancies were resolved through a third reviewer.

Methods of synthesis
Meta-analyses were conducted where there were at least two trials on a specific outcome. Statistical heterogeneity was assessed using the χ² and I² statistics (I²>30% moderate, I²>50% substantial and I²>75% considerable heterogeneity). Where trials had two or more control groups, one was selected in the order of preference: no treatment, usual care, education and exercise. Trials were analysed separately for short-term and long-term follow-up. Short-term was defined as after the end of the intervention and closest to 12 weeks after randomisation. Long-term follow-up was defined as...
closest to 12 months after randomisation. A standardised mean difference of 0.2 to 0.5 was deemed to indicate a small effect size, 0.5 to 0.8 moderate and more than 0.8 a large effect size.

Subgroup analysis was conducted for different control conditions and for acute or chronic pain. Sensitivity analysis was used to assess the role of study quality on robustness of results. Publication bias was assessed through funnel plots if at least 10 trials were included in a meta-analysis.

Levels of evidence were determined using the recommendations of the Cochrane Back Review Group. Strong evidence was defined as consistent findings among multiple RCTs with low risk of bias. Moderate evidence implied consistent findings from multiple high-risk RCTs and/or one low risk RCT. Limited evidence was defined as one RCT with high risk of bias. Conflicting evidence implied inconsistent findings among multiple RCTs. No evidence represented no RCTs.

**Results of the review**

Ten RCTs (967 patients) were included in the review. Eight RCTs provided data for the meta-analysis. Eight trials had low risk of bias and two had high risk of bias.

**Short-term results:** Yoga reduced pain when compared to control (SMD -0.48, 95% CI -0.65 to -0.31; I²=0%; six RCTs) and to back-specific disability (SMD -0.59, 95% CI -0.87 to -0.30; I²=59%; eight RCTs). Yoga did not improve quality of life compared with controls (SMD -0.41, 95% CI -0.11 to 0.93; I²=72%; four RCTs). Global improvement was greater in the yoga group (RR 3.27, 95% CI 1.89 to 5.66; I²=0%; two RCTs).

**Long-term results:** Yoga reduced pain when compared to control (SMD -0.33, 95% CI -0.59 to -0.07; I²=48%; five RCTs) and also back-specific disability (SMD -0.35, 95% CI -0.55 to -0.15; I²=20%; five RCTs). Yoga did not improve quality of life compared with controls (SMD -0.18, 95% CI -0.05 to 0.41; I²=0%; two RCTs).

Subgroup analyses demonstrated statistically significant improvements when yoga was compared to education but not when yoga was compared to exercise (two RCTs) or usual care (two RCTs).

Most of the reported adverse events were mild to moderate (three RCTs).

**Authors’ conclusions**

There was strong evidence for short-term effectiveness and moderate evidence for long-term effectiveness of yoga for chronic low back pain in the most important patient-centred outcomes.

**CRD commentary**

This review had clear, broadly defined inclusion criteria and was underpinned by a search of several sources of information. Study quality was assessed and most of the evidence was of good quality. Yoga as an intervention cannot be blinded and outcomes were self-reported by patients (self-reporting can lead to bias in favour of the active intervention). More than one reviewer was involved in extracting data and assessing study quality; it was unclear whether this procedure to minimise bias was also adopted for the study selection. Statistical pooling appeared to be appropriate but there was evidence of heterogeneity for certain outcomes and trials varied in their delivery of yoga with some included additional interventions.

The authors’ conclusions reflect the results but the evidence on effectiveness of yoga was more compelling when compared to educational interventions. There was insufficient evidence to state the effectiveness of yoga compared to exercise and to treatments offered under usual care.

**Implications of the review for practice and research**

**Practice:** The authors stated that the results of the review were applicable to most patients with low back pain seen in clinical practice. Yoga can be recommended as an additional therapy to patients who do not improve with education on self-care options.

**Research:** The authors stated that more trials comparing yoga to guideline-endorsed therapies such as exercise were needed. Different yoga styles needed to be compared. Assessing the effects of the different components of yoga was important. Future RCTs should use more rigorous methodology and ensure more thorough reporting of adverse events.
and reasons for drop-outs.

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