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Is Yoga Effective In Improving Functional Disability In Adults With Chronic Low Back Pain?

Alicia Kilpatrick, PA-S

A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For

The Degree of Master of Science

In

Health Sciences – Physician Assistant

Department of Physician Assistant Studies
Philadelphia College of Osteopathic Medicine
Philadelphia, Pennsylvania
December 14, 2012
ABSTRACT

OBJECTIVE: The objective of this selective EBM review is to determine whether or not yoga is effective in improving functional disability in adults with chronic low back pain.

STUDY DESIGN: This review consists of two randomized controlled trials published in 2009 and 2011 and one pilot randomized controlled trial published in 2010.

DATA SOURCES: Data sources were articles published in peer reviewed journals comparing yoga for the treatment of chronic low back pain compared to standard medical care found in PubMed and MEDLINE.

OUTCOMES MEASURED: Each of the three articles analyzed the effects of yoga therapy on improving functional disability. The Roland-Morris Disability Questionnaire and the Oswestry Disability Index were the ways the outcomes were measured.

RESULTS: Williams et al found yoga improved functional disability in adults with chronic low back pain. Tilbrook et al found that yoga resulted in greater improvements in back function. Cox et al found that yoga improved functional disability and pain, however the findings were not significantly different from standard care.

CONCLUSIONS: Two of the three reviewed trials concluded that yoga is a safe and effective alternative to improving functional disability in chronic LBP compared to standard medical care. The third study was inconclusive as it found yoga does improve functional disability; however the results were not statistically significant. Future studies should include ways to better increase response rate and adherence to yoga therapy and evaluate more objective outcomes to reduce errors in self reporting.

KEYWORDS: “low back pain,” “yoga”
INTRODUCTION

Chronic low back pain is one of the most common musculoskeletal disorders in the United States that will affect almost everyone at some point during their lives. Numerous demands are placed onto the lower back and spine every day, and with age the spine undergoes various structural and chemical changes to compensate. Some of these changes are maladaptive and destructive resulting in functional disability and pain. Chronic low back pain (CLBP) is a major public health issue characterized by back pain that persists for at least three months. Its impact is extensive and has been found to affect 15% to 20% of the population annually and up to 70% to 85% of the population over a lifetime.

Low back pain is a major cause of cause of job-related disability, pain, social and healthcare costs. It is the number one cause of disability in individuals under the age of forty five in the United States. Because spinal pain is multifaceted and can encompass a variety of etiologies the treatment is often complex and extremely expensive. According to Williams et al, low back pain accounts for more than thirty-four billion dollars annually in direct medical care costs. CLBP accounts for 20-25% of medical care claims, which represents the largest category. Low back pain also represents the number one reason for the use of complementary alternative medicine. The complementary alternative medicine industry has increased dramatically in the past few years and its utilization has increased nearly 10% as well.

While there is not an exact estimate of the number of healthcare visits each year, CLBP is still documented as the fifth most common reason for physician visits. It is estimated that nearly 40% of patients suffering from chronic low back pain sought medical care for help.
The majority of low back pain is caused by trauma or injury to the back; however various conditions can precipitate low back pain including degenerative diseases, osteoporosis, bone lesions, muscle or nerve irritation, viral infections, sprains, strains, or spasms of the muscles or ligaments, obesity, smoking, and stress.\(^5\)

Symptoms of CLBP usually include pain in the lumbosacral region, radiculopathy, numbness, weakness, limited range of motion and difficult ambulation. Certain positions or movements often exacerbate low back pain such as prolonged sitting, flexion, or extension of the lumbar spine.

Due to the complex and multifaceted nature of CLBP there are numerous standards of care for the treatment of low back pain to improve functional disability. Nonpharmacologic therapies include bed rest, ice, heat, lumbar support (bracing), William McKenzie flexion and extension exercises, regular exercise, proper lifting education, and weight loss counseling. In addition to nonpharmacologic therapies there are various medications that are also used in the standard of care. Pharmacologic therapies include NSAIDS, muscle relaxants, opioid analgesics, oral steroids, facet or spinal joint corticosteroid injections. Other alternatives for the treatment of back dysfunction include spinal manipulation through the use of osteopathic manipulative medicine, chiropractics, and spinal surgery.

Although exercise treatment for low back pain is widely utilized to improve functional disability, current evidence suggests that its impact is temporary and diminutive.\(^4\) Yoga, on the other hand, may be used as an alternative to the usual care methods in the treatment of chronic low back pain to improve functional disability in adults. Yoga offers an alternative treatment to regular exercise that provides several benefits in addition to improving functional disability.
Yoga provides a more holistic approach through a combination of mental focus and physical exercise. In addition it teaches patients correct posture in order to maintain continuous structural support. It also teaches patients relaxation techniques helping to relieve stress that accumulates in the spine and improves overall self-care. Yoga therapy focuses on certain postures that increase joint flexibility, muscle strength, balance, and mental focus. It is widely available and its structured classes encourage long term improvements in the functional disability of CLBP.

OBJECTIVE

The objective of this systematic review is to determine whether or not yoga is indeed effective in improving functional disability in adults with chronic low back pain.

METHODS

The studies in this systematic review included adults with chronic low back pain. Each of the articles compared yoga to standard medical care treatment of functional disability in adults with chronic low back pain and analyzed its effects on improving back dysfunction. Included in this analysis was a randomized controlled trial comparing standard medical care to a gradually progressing yoga program over a 3 month period. The second article was also a randomized controlled trial that compared usual medical care to 24 weeks of biweekly yoga classes. The third article was a pilot randomized controlled trial that compared usual medical care to 12 weekly yoga sessions designed to treat CLBP. The outcomes measured the efficacy of yoga for the treatment of low back pain by analyzing its improvements in functional disability.
The data sources collected for this EBM review were found through researching PubMed and Medline from December 2011 through December 2012. The keywords used in the searches included “yoga” and “low back pain.” All articles were written in English and published in peer reviewed journals. The articles were chosen based on their relevant outcomes to the topic and the importance of their information for patients. One of the main objectives required that the information be POEMs (patient oriented evidence that matters). Therefore, each article was carefully selected to fulfill this requirement. The outcomes discussed in each of the articles pertain to patient oriented evidence that matters. The inclusion criteria included randomized, controlled trials involving adults with chronic low back pain. The exclusion criteria included patients under the age of 18 and patients without a history of low back pain or specific preexisting conditions. The summary of statistics reported or used includes p-values, confidence intervals (CI), and mean changes from baseline. The demographics of included studies can be found in Table 1 below.
### Table 1: Demographics and Characteristics of included studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>#Pts</th>
<th>Age (yrs)</th>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
<th>W/D</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tilbrook®</td>
<td>RCT</td>
<td>313</td>
<td>18-65</td>
<td>Visit to pcp within 18 months for LBP; 4 or &gt; on RMDQ; musculoskeletal pain in lowest ribs and gluteal folds; able to attend yoga venue; physically mobile</td>
<td>No baseline questionnaire; performed yoga in previous 6 months; pregnant; serious co-morbidities; previous spinal surgery; psychiatric problems; alcohol dependent; spinal neurologic abnormality</td>
<td>13</td>
<td>Randomized to 75 minutes of weekly Yoga therapy for 12 weeks or usual care</td>
</tr>
<tr>
<td>Williams¹</td>
<td>RCT</td>
<td>90</td>
<td>18-70</td>
<td>English speaking; insured; BMI&lt;27; chronic low back pain, ODQ score between 10-60; VAS score between 3-8cm; physically mobile; agreed to not seek other care; attend 20 weeks and 40 classes and practice at home if randomized to yoga therapy group</td>
<td>Serious back disorders; pregnancy; serious co morbidities; neurological disorders; worker’s compensation case for LBP; prior yoga therapy</td>
<td>16</td>
<td>Randomized to 90 minutes of biweekly Iyengar yoga for 24 weeks or usual care</td>
</tr>
<tr>
<td>Cox³</td>
<td>RCT results of a pilot study</td>
<td>20</td>
<td>18-65</td>
<td>4 or &gt; RDQ, visit to pcp in previous 18 months with low back pain; able to attend the yoga classes; physically mobile</td>
<td>Pregnancy; psychosis; substance abuse; current yoga participation; currently in trial for LBP; spinal surgery; serious spinal or neurological pathology</td>
<td>5</td>
<td>Randomized to 12 weeks of 75 minute specialized yoga back classes or usual care</td>
</tr>
</tbody>
</table>

**OUTCOMES MEASURED**
Although the outcomes measured in each of the articles were POEMS, the measured outcomes varied slightly per study. Multiple outcomes were assessed, but for the purpose of this review only functional disability was analyzed. Williams et al measured functional disability through the Oswestry Disability Index (ODI), which is scored from 0 to 10 with 10 indicating the greatest functional disability. Tilbrook et al and Cox et al measured back function through the Roland-Morris Disability Questionnaire (RMDQ). The RMDQ is a 24 point scale (0= no dysfunction, 24= greatest disability) that assesses the patients functional disability.

RESULTS

The authors of the reviewed articles failed to provide dichotomous data, and the continuous data was not able to be converted to dichotomous data. Therefore NNT, ARR, and RRR were not able to be calculated.

Cox et al compared a 12 week course of Iyengar yoga (n=10) with adults between the ages of 18-65 years of age to usual medical care (n=10). Included in the yoga group were patients who had been to their primary care doctor within the previous 18 months. Pregnant patients and those under 18 years of age were excluded. Both groups were given a booklet composed of information on how to manage their LBP. The Iyengar yoga was taught in a gradual progression beginning with simple relaxation techniques and ending with more complex standing, supine, and prone poses targeted to strengthen and improve back function. Adherence was poor as 50% of participants allocated to the yoga group did not attend any classes. At follow up 66.6% of the patients assigned to the intervention group showed improvements in the RMDQ scale by at least two points compared to 55.6% of those in the usual care group. Cox et al reports that a change between 2 and 3 points on the RDQ is the minimum change determined
to be clinically significant. However, yoga did not prove to have a statistically significant effect on improving functional disability (p-value=0.72). See Table 2 below for the results.

<table>
<thead>
<tr>
<th></th>
<th>Yoga Group</th>
<th>Control Group</th>
<th>Mean Difference (95% CI)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMDQ</td>
<td>-1.76 (6)</td>
<td>-2.94 (9)</td>
<td>-1.18 (-8.09 to 5.74)</td>
<td>0.72</td>
</tr>
</tbody>
</table>

The second study conducted by Williams et al randomized a total of 90 participants to either the yoga group (n=43) or the standard medical care group (n=47). Of the 90 participants sixteen did not complete the 24 week study. There were 12 dropouts from the yoga group and 4 from the control group. On average the participants in the yoga group (n=31) attended 88.5% of the classes and completed home practice on 87.1% of the total days. There was a statistically significant improvement in the functional disability of the yoga group (p=0.016) using the ODI as depicted by the repeated measures ANOVA. The chi-square test showed that the participants randomized to the intervention group experienced greater clinical improvements as measured by the ODI. Intention to treat analysis revealed a 10% to 12% increase in clinically important improvements in the ODI.

At six months follow-up, the repeated measures ANOVA for intention-to treat and per-protocol analysis revealed that there was a statistically significant improvement in treatment group x time interactions for the ODI. As depicted in Table 3, intention to treat and per protocol revealed a statistically significant reduction in functional disability in the yoga group. Improvements in functional disability were also depicted by the mean changes from baseline. From baseline to follow-up, the change scores for the yoga group in the intention to treat analysis
were -3.1±1.43 (negative values indicate improvements). In the control group the change scores were 0.8±0.89. In the per protocol analysis the change scores for the yoga group were -4.9±1.41 and the control group were -0.8±1.02.

Table 3. Baseline (SEM) and adjusted post-treatment means for functional disability comparing yoga and standard medical care.*

<table>
<thead>
<tr>
<th></th>
<th>Yoga Group (n=43)</th>
<th>Yoga Group (n=43)</th>
<th>Control Group (n=47)</th>
<th>Control Group (n=47)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>After</td>
<td>Baseline</td>
<td>After</td>
<td></td>
</tr>
<tr>
<td>Intention to Treat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODI</td>
<td>25.2 ± 1.08</td>
<td>22.2±1.60</td>
<td>23.1±1.58</td>
<td>22.2±1.59</td>
<td>0.006**</td>
</tr>
<tr>
<td>Per Protocol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODI</td>
<td>24.1±1.22</td>
<td>19.2±1.63</td>
<td>23.4±1.78</td>
<td>22.6±1.99</td>
<td>0.001**</td>
</tr>
</tbody>
</table>

*This information came directly from Williams et al. SEM= standard errors of mean. **P< 0.05  indicates statistical significance.

In the third study conducted by Tilbrook et al, 313 participants were assigned to either the yoga group (n=156) or the usual care group (n=157). There were a total of sixteen yoga courses with about nine participants divided into each group. All of the yoga instructors were trained to teach the same form of yoga, which included fundamental basics for improving overall back and mental health. The yoga included certain postures and poses adopted from asana and pranayama that included sitting, standing, prone, and supine poses targeted towards improving back function and strength. The courses also educated the participants about proper back care and posture and incorporated relaxation techniques and philosophy. There were a total of 12 seventy-five minute classes offered once a week. The participants in the yoga group were also encouraged to continue practicing yoga at home.

According to the RMDQ, the yoga group had better back function at completion of the study. The baseline and follow up results comparing the intervention group to the control group
are listed in Table 4. As illustrated in Table 4, the RMDQ score was 2.17 points lower in the yoga group (95% CI, 1.03 to 3.31 points) compared to the control group. Tilbrook et al also found that there was a statistically significant reduction in functional disability in the yoga group (p-value= <0.001).

Table 4. Mean changes from baseline for functional disability*

<table>
<thead>
<tr>
<th></th>
<th>Yoga group (n=156)</th>
<th>Usual care group (n=157)</th>
<th>Between group differences in means</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMDQ Baseline</td>
<td>7.84 (3.96)</td>
<td>7.75 (4.72)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMDQ After</td>
<td>-2.14 (-3.00 to -1.29)</td>
<td>0.03 (-0.89 to 0.94)</td>
<td>-2.17 (-3.31 to -1.03)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*This information came directly from Tilbrook et al.

This study also performed a sensitivity analysis to account for the missing data from some of the participants. Under the best-case analysis the participants in the yoga group showed better back function. However, the worst-case analysis showed that there was no difference in improvements in functional disability between the yoga group and the control group

Tilbrook et al reported 12 of 156 yoga participants reported adverse events, however, only 1 was considered serious and possibly related to yoga. The others were not serious and possibly due to increased pain. The remaining studies reported that there were no serious or life threatening side effects or adverse events. Prior to participation in yoga therapy for LBP, it is important to seek advice from a general practitioner to determine through an extensive medical history and physical examination that the etiology of the LBP is musculoskeletal in nature.

DISCUSSION

Due to the vast and extensive effects of CLBP on society, a safe and effective alternative to the standard of care for the treatment of CLBP is needed. Current research suggests that
maintaining mobility is helpful in the management of CLBP. Yoga is widely available and
accessible and its expenses are currently reimbursed by some major insurance providers.

Cox et al also explored the theory that yoga is an effective treatment alternative to
improving functional disability in adults with CLBP. The study revealed that functional
disability improved at follow-up, however, it was not statistically significant. Factors that
contributed to this study’s lack of statistical significance were its small sample size and its losses
to follow up for the yoga group. Given the study’s small sample size and poor adherence, the
improvement in back function is still remarkable. The authors noted that only 60% of the
patients randomized to the yoga group returned their 12-week follow up data compared to 90%
from the usual care group.

Williams et al found yoga to be an effective alternative to usual care in the management
of adults with CLBP. This study found that the individuals randomized to the yoga group
experienced significantly greater improvements in CLBP. The authors found it beneficial to
offer yoga therapy over a longer time period as opposed to a shorter interventional duration.
This resulted from the length of the program that enabled its participants to sustain long term
benefits and help prevent relapse.

Tilbrook et al found yoga therapy for 12 weeks to be a safe and effective treatment for
improving functional disability. This study found that the yoga group benefited from 2.17 fewer
limited activities at 3 months as measured by the RMDQ. In order to maintain improvements in
functional disability additional classes over a longer period of time may be indicated. This study
showed that greater improvements in functional disability were found after longer courses of
yoga therapy were applied. Although this study had a large sample size, under the sensitivity
analysis there was a discrepancy between-case and worse-case scenario. The authors state that the implication of this analysis is rarely known because they are highly unlikely scenarios.  

In addition to the limitations of the studies described above, a few other weaknesses were noted. First, the studies relied heavily on self-reporting which can lead to bias. Also, as stated by Williams et al, some of the participants at baseline had minimal disability as measured by the ODI. Therefore, a minimum inclusion limit should be set for LBP. Cox et al discussed the use of phone calls, emails, and/or text messages as reminders to increase adherence to yoga therapy and response rate.

CONCLUSION

Two of the reviewed articles support that yoga is effective in improving the functional disability in adults with chronic low back pain. One of the articles supports this theory; however, its findings were not significant. Therefore the evidence is conflicting. At this time, more large scale studies are needed to explore the long term effectiveness of yoga for CLBP. However, given the size of the studies, the results showed significant changes from baseline. Tilbrook et al found that offering a twelve week yoga program led to greater improvements in functional disability as compared to the usual care group for up to 12 months.

Future studies are warranted to determine the statistical significance of the use of yoga for CLBP. Current research suggests yoga improves posture, strength, mobility, and provides mental focus and relaxation which are all important life-long tools to improve back function. Additional studies should enforce and incorporate tighter controls on participants’ self-reporting and their adherence to the intervention. This will help produce more substantial results that can enable yoga to be incorporated into the healthcare field as an alternative treatment for CLBP.
References


