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Is Yoga Therapy Effective in Reducing Chronic Lower Back Pain in Adults?

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

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Abstract

Objective: The objective of this selective EBM review is to determine whether or not "Is yoga therapy effective in reducing chronic lower back pain in adults."

Study Design: Systematic review of 2 randomized controlled trials (RCT), 1 randomized clinical trial, published after January 2017, and in English language.

Data Sources: Both RCTs and the randomized clinical trial were published in peer-reviewed journals, found through the PubMed database, and were selected based on relevance to the clinical question and if outcomes were patient oriented (POEMS).

Outcome(s) measured: All 3 studies measured pain, using a variety of pain measurement scales such as the Brief Pain Inventory, Numeric Rating Scale for pain, and the Defense and Veterans pain rating scale (24-hour pain with functional statements).

Results: Groessl et al. found a significant difference in pain reduction after 12 weeks of yoga therapy when compared to a delayed treatment group (p-value <0.005), however in those completing yoga therapy, after 12 weeks there was no significant decrease in pain (1.0 point) with an average of -0.61 and a CI of (-0.94, -0.28) (*Am J Prev Med*. 2017;53(5):599–608. doi:10.1016/j.amepre.2017.05.019). Kuvačić et al demonstrated that there were significant differences in pain reduction between the pamphlet control and yoga therapy groups (p-value <0.001) and within each group during post-testing (*Complement Ther Clin Pract.* 2018;31:262-267. doi.org/10.1016/j.ctcp.2018.03.008). Highland et al found a clinically significant difference in post treatment pain after RESTORE yoga compared to treatment as usual (p-value .001) (*Arch Phys Med Rehabil.2018*;99(1):91-98. doi.org/10.1016/j.apmr.2017.08.473).

Conclusion: This EBM review demonstrates that yoga therapy is an effective treatment option for patients with chronic lower back pain (CLBP), especially when compared to other traditional treatment options. However more research needs to be done to evaluate the within group and long term effects of yoga therapy.

Key Words: Yoga, Low back pain.

INTRODUCTION

Chronic low back pain (CLBP) is defined as lower back pain that lasts more than 12 weeks, and is an extremely prevalent condition among the general population in the United States, with as many as 80% of adults experiencing LBP once in their life.[1-3] CLBP is the leading cause of lost productivity in the United States, totaling an estimated $100-200 billion annually.[2] Additionally, CLBP accounted for 18% (52 million) of total United States healthcare visits in 2010, and is the second leading cause of disability.[2,4] To date, studies focusing on CLBP are limited, however the total economic and healthcare costs, and impact on patient quality of life, keeps the question of how to effectively treat CLBP relevant to both patients and healthcare practitioners.[2]

CLBP is most commonly caused by mechanical or soft tissue injuries, however poor posture, degenerative diseases of the spine, nerve root compression and other conditions can lead to the development of CLBP.[2] Psychosocial factors also impact the perception of CLBP, mainly anxiety and depression.[2,5] Symptoms of CLBP commonly include low back pain, fatigue, reduced range of motion, functional limitation, reduced quality of life, and depression.[1]

Lifestyle modification combined with NSAID use is the mainstay of treatment for CLBP. Common non-pharmacologic therapies consist of rest/activity as tolerated, physical therapy, massage and acupuncture, heat and ice combinations, and education on proper lifting and posture.[5] Additionally, NSAID medications such as ibuprofen have been found to reduce inflammation, improve pain, and increase movement in those with both acute and chronic low back pain, however these medications are not recommended for long-term use.[5] Second line pharmacologic therapy consists occasionally of muscle

relaxants such as cyclobenzaprine, which is effective in acute low back pain, however their effect in controlling CLBP remains to be seen.[5] It is important to mention that opioids are not recommended for treatment of CLBP, or to help alleviate CLBP symptoms. Opioid therapy does not improve pain control after 1 year of use, and has been shown to result in negative side effects when compared to patients treated without opioids.[5]

Despite the numerous treatment options available for patients with CLBP, there are limited options that are effective, practical, and safe for long-term use. Physical therapy, acupuncture, massage, and other non-pharmacologic therapies can become expensive and patients often need pay out of pocket for these services. Additionally, pharmacologic therapies are not recommended for long-term use due to significant risks and side effects and do not treat the cause of CLBP but rather the symptoms. However, yoga therapy has been shown to help reduce stress, anxiety, and depression, all of which can help improve perception of pain from CLBP.[3] Yoga therapy can be learned in a class/instructor setting, and then practiced on the patient's own time, giving the patient independence and control over their own therapy. This systematic review examines 2 RCTs and 1 randomized clinical trial evaluating the effectiveness of yoga therapy for CLBP in adults compared to various control groups.

OBJECTIVE

The objective of this selective EBM review is to determine whether or not "Is yoga therapy effective in reducing chronic lower back pain in adults?".

METHODS

Articles were found via the PubMed database using the key words "Yoga" and "Low back pain" and were then selected based on if the outcomes were patient oriented as well as their relevance to my clinical question. All articles met inclusion criteria of: being published after 2017/01/13, English language, involving humans, and being a clinical trial. Studies published in non-English languages, involving non-humans, or that were published before 2017/01/13 were excluded. There were three studies that met the selected criteria and were chosen for this EBM review; 2 randomized controlled trials (RCT) and 1 randomized clinical trial. The statistics used in the articles include CER, EER, RBI, ABI, NNT, CI, mean change from baseline, and p-value.

The population studied included adults with diagnosed CLBP. All three studies used yoga therapy as an intervention, and comparison groups were either defined as pamphlet education, delayed treatment, or treatment as usual. The outcomes measured in all three studies included pain reduction as compared to baseline. See Table 1 for demographics, inclusion, and exclusion criteria for each study in this systematic review.

OUTCOMES MEASURED

All three studies measured pain, using a variety of pain measurement scales that were reported by the patients. The Groessl et al study used the Brief Pain Inventory (BPI) to measure pain intensity at baseline, 6 weeks, and 12 weeks.[1] The BPI consists of a short list of questions that allow patients to describe the intensity of their pain and how it interferes with their daily functioning and affect. BPI is an 11-point numerical scale, a score of 0 indicates no pain, while a score of 10 indicates the highest amount of pain possible.[1]

Table 1. Demographics & Characteristics of Included Studies

Study	Type	# Pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Groessl[1] (2017)	Rando mized clinical trial	150	>18	>18yrs, VA pts, CLBP diagnosis >6mo, no new pain treatments last 6 months, English literacy, no new pain treatments	Recent back surgery (<12mo), obesity, acute sciatica, chronic lumbar radicular pain, + Romberg, prior yoga >1x in the last year	0	Instructor led yoga (60min) 2x/week x12 weeks vs. delayed treatment (DT) group
Kuvačić (2018)	RCT	30	>18	CLBP, >18yrs, depression and anxiety (Zung questionnaire)	Acute LBP, specific causes of LBP, current neurologic or psychiatric conditions, prior yoga practice, obesity, recent CVA or MI	0	Instructor led yoga (75min) 2x/week x 8 weeks vs. Pamphlet group
Highland[6] (2018)	RCT	68	18-64	Eligible for DOD healthcare, LBP dx, defense& veterans pain rating score >4 for >3mo, English literacy	Medically advised to avoid exercise, other chronic medical conditions, recent back surgery (<12mo), hx TBI, practiced yoga in the last 6mo, chronic fatigue, fibromyalgia	0	RESTORE instructor led yoga program (60min) 2x/week in week 1-4, 1x/week 5-8 vs. treatment as usual

Kuvačić et al used the Numeric Rating Scale (NRS) to measure pain perception on a scale from 0-10, with a score of '10' being the worst pain level, and was measured both pre- and post-intervention.[3] Highland et al used the Defense and Veterans Pain Rating

Scale to measure pain through functional statements graded on an 11-point numerical scale, with a pain score of 1 being "hardly noticeable" and 10 being pain "as bad as it could be."[6] Additionally, 4 supplemental questions that focus on functioning (activity, sleep, mood, stress) are graded on the same 0-10 point scale.[7] Patients completed the Defense and Veterans Pain Rating Scale at baseline, mid-treatment, post-treatment, and at 3 and 6 month follow ups.[6]

RESULTS

The Groessl et al study was a RCT with two arms that included a yoga intervention group and a delayed-yoga group. The instructor-led yoga group was held for 12 weeks, and consisted of two 60-minute classes per week. Participants received a home practice manual and were instructed to practice yoga for 20 minutes on the days instructor-led classes were not held. The delayed-yoga group continued treatment as usual and was asked to not participate in yoga until after the 6-month evaluation. Instructor reminders, monthly phone calls, and additional reminders helped to ensure patient compliance. There was a final sample size of 150 participants. Seventy-six patients were allocated to the yoga therapy group; 20 participants discontinued yoga intervention and 1 completely withdrew from the study.[1] The final intent to treat analysis included 75 participants. The delayed treatment group of 76 had 3 participants who did not wait 6 months to perform yoga, and 1 who completely withdrew from the study. As a result the final intention to treat analysis for the control group was 75 patients.[1] Demographics, inclusion, and exclusion criteria are found in Table 1.

Patient pain-intensity was measured using the BPI, a self-report survey answered at the start of the intervention (baseline), at 6 weeks, and 12 weeks. The researchers

measured change in pain intensity between groups by calculating the mean change from baseline using a linear mixed-effects model for change as seen in Table 2. At 12 weeks the yoga group had a decrease of 0.61 in their BPI, whereas the control group had a slight increase in pain at 0.04.[1] A p-value of < 0.05 was used to determine if these differences in results were statistically significant between groups, with a CI of 95%.[1] At 12 weeks there was a calculated p-value of 0.005, indicating a significant difference between the control and treatment groups, however the mean change in BPI score was <1.0 point, at -0.65 listed in Table 2, indicating a small effect size of the yoga therapy.[1]

Table 2: Comparison of Yoga Therapy vs. Delayed Treatment Group Measured by BPI, in Groessl et al

	Baseline score M (SD)	Change at 12 weeks, M (95% CI)	*p*-Value 12 weeks
Yoga group	4.64 (1.76)	-0.61 (-0.94, -0.28)	
Control group	4.68 (2.16)	0.04 (-0.27, 0.35)	
Between group difference	-	-0.65 (-1.10, -0.20)	<0.005

The Kuvačić et al study was a randomized controlled trial with two arms comparing an interventional yoga group and an educational pamphlet control group. The sample size of this study was 30 participants, with the participants being divided evenly between yoga and pamphlet groups.[3] Demographics, inclusion, and exclusion criteria are found in Table 1. The yoga group participated in two 75-minute instructor led yoga sessions per week, for 8 weeks, that combined several different yoga teachings to focus on CLBP. The control group received a pamphlet, which contained information about the vertebral spine and biomechanical functions. Additionally it included proper techniques on lifting, proper posture, and breathing techniques that the participants should perform twice per week.[3] The authors only mentioned that instructors supervised

yoga sessions, but no mention was made of further at home instructions or how compliance was measured.

Pain was evaluated through the NRS 0-10 scale to measure pain perception pre- and post-treatment; mean NRS values can be found in Table 3. The mean change in NRS scores for the yoga group from pre- to post-treatment was -1.6, and for the pamphlet groups the mean change in NRS scores pre- and post-treatment was -0.67. To evaluate outcomes, a Scheffe post-hoc test for comparing between and within groups was used, with a p-value of <0.05 indicating statistical significance.[3] As seen in Table 3, results comparing changes in NRS scores pre- and post-treatment between yoga and pamphlet control groups were determined to be statically significant (p-value <0.001). A statistically significant difference was also seen in post-testing comparison for within groups (p-value <0.001).[3]

Table 3. Comparison of Yoga Therapy vs. Pamphlet Educational Group Measured by NRS, in Kuvačić et al

	Mean Pre-treatment NRS Score (SD)	Mean Post-treatment NRS Score (SD)	*p*-Value
Yoga group	3.33 (0.82)	1.73 (0.59)	<0.001
Pamphlet group	3.60 (0.63)	2.93 (0.59)	<0.001
Between group difference	-	-	<0.001

The Highland et al study was a RCT with two arms that compared an instructor led RESTORE yoga program to treatment as usual. RESTORE yoga is a therapeutic yoga program that is specifically designed for targeting muscles that are impacted by low back pain. Participants attended two 60-minute yoga sessions per week in weeks 1-4, and 1 session in weeks 5-8.[6] Home participation was optional for participants. The control group continued to receive treatment as usual as defined by their healthcare practitioner. There were a total of 68 participants in the study, split evenly between RESTORE yoga

group and the control group.[6] The RESTORE yoga group analyzed 34 participants, however throughout the study 1 participant did not attend any yoga sessions, and only 13 participants attended 12/12 sessions. The control group analyzed 34 participants but 3 participants completed 0-3 weekly calls, and only 22 completed the full 6/6 weekly phone calls.[6] Compliance was measured through attendance to yoga sessions, or weekly phone calls for the control group. Demographics, inclusion, and exclusion criteria are found in Table 1.

Pain was measured through the Defense and Veterans Pain Rating Scale, which measures pain related to functional limitations on an 11-point scale. The authors defined clinically meaningful reduction in pain to be a 2-point or 30% reduction in pain.[6] During post-treatment follow up, 7 participants (23%) of the control group performing treatment as usual had clinically meaningful improvement, whereas 19 participants (66%) in the RESTORE program had clinically meaningful improvement.[6] The p-value calculated for these post-treatment results was 0.001, which indicates statically significant results (Table 4).[6] Statistical analysis of the data (Table 5) collected by the authors yielded a clinically significant NNT of 3, which can be interpreted as follows: for every 3 patients treated with yoga, one more had a significant pain reduction when compared to treatment as usual.

Table 4. Frequencies (Percentages) of Participants Reporting Clinically Meaningful Change in Pain from Baseline to Post-Treatment

Post-treatment	n (%)	*p*-Value
Control	7 (23)	0.001
RESTORE	19 (66)	

Table 5: Statistical Analysis of Highland et al on Yoga Therapy Improving CLBP

NNT	EER	CER	ABI	RBI
3	0.66	0.23	-0.43	-1.87

Discussion

Despite all three studies determining that yoga therapy did help reduce CLBP, each study had limitations. One over arching issue was sample size and demographics. Groessl et al had the largest sample size in this systematic review of n=150 participants, however the population was selected from former military veterans, and as a result 74% of the total sample size was male.[1] Highland et al had a small sample size (n=68), where 34 participants were analyzed in both the RESTORE group and the control group.[6] Despite also using military service members and veterans like Groessl et al, Highland et al did not have significant difference in male and female participants, with a p-value = .21.[6] Additionally, Kuvačić et al had the smallest sample size (n=30) of this systematic review, with 15 participants in both the yoga and pamphlet group.[3]

Prevalence of CLBP can be found equally distributed between both males and females, and in some age groups it is more common in females.[2] The results from these three studies have limitations in generalizability to the population as a whole as CLBP is a common and widespread condition effecting a variety of genders and populations. In future studies, efforts should be taken to diversify and increase sample sizes to increase the generalizability of the results.

Another overarching limitation between all three studies in this systematic review was the issue of supervision and how yoga groups received treatment as usual. All studies discussed here used both experimental and control groups that continued to receive treatment as usual. CLBP treatment as usual can range from massage therapy, NSAIDs, or muscle relaxants, and throughout the duration of these studies each individual's treatment was allowed to continue with guidance from their healthcare practitioner.[5] As a

result, studies were not able to control for these other treatment variables that were different between each participant. Therefore, the decreases in pain observed in the studies may not be entirely attributable to yoga therapy alone. Since yoga therapy is never suggested as stand alone therapy for CLBP but rather as an adjuvant to other treatment modalities, the data obtained could be interpreted as realistic to patients currently undergoing CLBP treatment. However, future studies could benefit from attempting to isolate the effect of yoga compared to no treatment at all.

Kuvačić et al measured pain as a secondary measure, but did so through the use of an 11 point NRS survey.[3] Participants would rate their pain on a scale from 0-10, indicating their level of pain at the time, however the authors make no mention of whether or not this scale included pain in relation to functional or daily-life statements like Groessl et al (BPI) or Highland et al (Defense and Veterans Pain Rating Scale).[1,6] While the NRS is simple and efficient for patients to use, the lack of functional statements means the participants could be less likely to focus on pain in relation to activity and how it limits them in daily life. Although the NRS shows high correlations with other pain-assessment tools, it has been reported to be less reliable in detecting changes in pain over time and future studies would benefit from incorporating multiple pain measurement scales.[8]

Another limitation between studies is a lack of specific instructions for at home yoga practice, as well as safety measures to ensure proper technique and duration of practice. As with many other treatment modalities for CLBP, consistent use of therapy leads to improved pain control. Groesl et al was the only study to specifically instruct participants on how to practice home yoga, the other two studies failed to guide

participants in home yoga or track participant use of home yoga. Home-practice of yoga and the quality of practice likely varied between all participants within these studies and could impact the results of the studies. Additionally, the lack of supervision and instruction could lead to further safety and efficacy issues within each study.

CONCLUSION:

The studies in this systematic review support the use yoga therapy in adults for reducing CLBP. All three randomized controlled and clinical trials reported a significant reduction in CLBP pain after completing yoga therapy programs compared to controls. Despite all three studies reaching a significant p-value as determined by the authors, one important distinction is worth noting in Groessl et al in terms of the effect size of yoga therapy. In Grossl et al the patients BPI score only decreased by 0.65, which is <1.0, the deemed value for significant pain reduction.[1] Future studies can look into using different pain measurement scales, as well as patient surveys that indicate whether or not they felt as if their pain as been significantly reduced. As discussed prior, future studies can aim to diversify their sample population and sample size, as well as provide more structure to what treatment as usual refers to while participating in a yoga therapy program in order to reduce variables. Yoga therapy is an effective adjunctive therapy to conventional treatment measures for CLBP and once learned, can be a safe and convenient treatment option.

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