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# **Does Yoga Therapy Improve Physical Pain in Females and Males With Diagnosed Rheumatoid Arthritis?**

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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

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## ABSTRACT

**OBJECTIVE:** The objective of this selective EBM review is to determine whether or not yoga therapy improves physical pain in females and males over the age of 18 with diagnosed rheumatoid arthritis.

**DESIGN:** Review of three randomized control trials (RCTs), two written in English and one written in Hindi and translated to English, which were published in 2011, 2013, and 2015.

**DATA SOURCES:** Three randomized control trials, one of which was a double blind study, published in peer-reviewed journals found via PubMed.

**OUTCOMES MEASURED:** Physical pain due to rheumatoid arthritis was measured using Short form (SF36) Physical Component Summary, which assesses 8 domains (including pain) with higher scores representing better health related quality of life and Simple Descriptive Pain Intensity Scale (SDPIS), which measures the pain intensity ranging from no pain (0) to worst possible pain (5). Statistics were reported using NNT, mean difference from baseline, ANOVA, and p values.

**RESULTS:** All three studies showed significant improvement in physical pain in males and females with rheumatoid arthritis. Evans et al. showed the numbers needed to treat is four, meaning four patients need to participate in yoga therapy in order to prevent one negative outcome, and a P value of 0.02. In Singh et al., repeated-measure ANOVAs were conducted, but the values were not presented in the article. The authors did state that the ANOVAs showed a “statistically significant difference between two states (before and after) in pain intensity.” A P value of <0.001 was reported for this study. In Moonaz et al., a mean difference from baseline of 9.6 at eight weeks was reported. This represents results from SF36 Physical Component summary, which assesses eight domains including: physical function, physical roles, and bodily pain. A P value of <0.05 was also reported.

**CONCLUSIONS:** All three studies showed that there was an improvement in physical pain severity caused by rheumatoid arthritis after participation in yoga therapy. However, further studies with larger sample sizes that examine the specific yoga positions used will be needed to strengthen the conclusion that yoga therapy is effective in treating physical pain in men and women over the age of 18 diagnosed with rheumatoid arthritis.

**KEY WORDS:** Rheumatoid arthritis, Yoga

## INTRODUCTION

Rheumatoid arthritis is an autoimmune disease that causes joint inflammation, as well as other systemic symptoms, including fatigue, fever, and weight loss. In rheumatoid arthritis, the body's immune system mistakenly attacks the joints, causing inflammation and thickening of the joint synovium. This can lead to damage to the joint cartilage and the bones at and near the joints, causing loss of joint space. The joints can become unstable and painful. Joint deformity can occur as well, which is [irreversible](#). Rheumatoid arthritis typically affects joints symmetrically and most commonly affects the joints of the hands, feet, wrists, elbows, knees, and ankles.<sup>1</sup> Other symptoms include: morning stiffness lasting more than 30 minutes, rheumatoid nodules, and anemia of chronic disease.<sup>1</sup> The exact cause of rheumatoid arthritis is not completely understood, although there is a connection between the development of rheumatoid arthritis and [individuals](#) born with specific genes, including the human leukocyte antigen class II genotypes.<sup>1,2</sup>

Rheumatoid arthritis affects about 1.5 million people in the United States, and women are three times more likely to be afflicted with rheumatoid arthritis than men.<sup>1</sup> Women are most commonly diagnosed with rheumatoid arthritis between the age of 30 and 60, while men are usually diagnosed later in life.<sup>1</sup> Rheumatoid arthritis is relatively common, affecting 1% of the population, and the direct cost of [the condition](#) has been estimated to be \$13,549 per person per year in a U.S.-based study that focused on patients who had been hospitalized for rheumatoid arthritis.<sup>3,4</sup> According to Lubeck et al., “[d]irect healthcare costs are 2 to 3 times higher [for individuals with rheumatoid arthritis] than average costs for individuals of similar age and gender.”<sup>4</sup> Rheumatoid arthritis can affect the economy indirectly via the cost of absenteeism due to rheumatoid arthritis, which was estimated to be \$252 million annually.<sup>5</sup> It has also been

estimated that individuals with diagnosed rheumatoid arthritis visit a rheumatologist an average of 7.2 times per year.<sup>5</sup>

Currently, there is no cure for rheumatoid arthritis. Although the current treatments can improve the symptoms of rheumatoid arthritis, they cannot reverse the damage and deformity to the joints caused by it. Non-steroidal anti-inflammatory drugs, NSAIDs, such as ibuprofen and naproxen sodium, can be used to reduce pain and joint inflammation; although, they can cause stomach bleeds if used too often for extended periods.<sup>6</sup> Prednisone and other corticosteroids, which are used to reduce pain and inflammation and slow joint damage, can be administered orally, intravenously, intramuscularly, or injected directly into the joint space.<sup>6</sup> Corticosteroids can cause weight gain, a cushingoid appearance, and increased blood sugars if used for extends periods of time.<sup>6</sup> Disease modifying anti-rheumatic drugs (DMARDs) are the only class of drugs that have been shown to slow the progression of rheumatoid arthritis.<sup>6</sup> This class of drug includes methotrexate, hydroxychloroquine, and sulfasalazine.<sup>6</sup> The newest medical treatments for rheumatoid arthritis are the biologic agents, adalimumab, infliximab, and rituximab.<sup>6</sup> Surgical treatments can be very beneficial at improving pain caused by structural or mechanical changes due to the inflammatory process.<sup>6</sup> These procedures include synovectomy, tendon repair, joint fusions, and total joint replacements.<sup>6</sup> Physical and occupational therapy are also very important components in the treatment of rheumatoid arthritis.

A similar option to physical and occupational therapy is yoga therapy. Yoga therapy may help alleviate the painful symptoms of rheumatoid arthritis without causing adverse drug reactions and may potentially decrease related healthcare visits. Yoga therapy can also be very relaxing, and may be considered as a fun alternative to physical or occupational therapy. This

paper analyzes three double blind randomized control trials evaluating the efficacy of yoga therapy improving physical pain for patients with rheumatoid arthritis.

## OBJECTIVE

The objective of this selective EBM review is to determine whether or not yoga therapy improves physical pain in females and males over the age of 18 with diagnosed rheumatoid arthritis.

## METHODS

The criteria for selection included that the population consists of males and females with a diagnosis of rheumatoid arthritis. The participants had to be over the age of 18. Patients who were unable to participate in yoga therapy were excluded from these studies. All studies included were randomized control trials. The interventions used were yoga therapy with continued conventional therapy or conventional therapy alone. Moonaz et al. compared individuals participating in two 60-minute classes and one home practice of yoga a week for 8 weeks to individuals receiving their usual care for 8 weeks.<sup>7</sup> In Evans et al., individuals participating in two 90-minute yoga classes per week for 6 weeks were compared to patients receiving routine care for rheumatoid arthritis.<sup>8</sup> Singh et al. compared individuals participating in 90-minute yoga classes 6 days a week for 7 weeks to individuals who continued their normal medications as prescribed.<sup>9</sup> The tools used to measure the effectiveness of yoga therapy on improving physical pain included a Short Form-36 (SF36) Physical Component Summary, which assesses eight domains (including pain) with higher scores representing better health-related quality of life; a Pain Disability Scale, which measures pain on a scale of most pain (0) to least pain (10); and a Simple Descriptive Pain Intensity Scale (SDPIS), which measures the pain intensity ranging from no pain (0) to worst possible pain (5).<sup>7,8,9</sup>

Ideal articles were searched for by the author using the key words “rheumatoid arthritis” and “yoga” using PubMed in December 2016. All included studies were randomized control trials published in peer-reviewed journals. The articles were selected based on their relevance to the clinical question “Does yoga therapy improve physical pain in females and males with diagnosed rheumatoid arthritis?”. Additionally, the articles had to include patient-oriented outcomes that matter (POEMs) regarding improvement in physical pain caused by rheumatoid arthritis. Of the articles selected, two were published in English and one was published in Hindi and translated to English. Articles excluded contained those published before 2011, those that included participants under the age of 18 years old, previous Cochrane reviews, and systemic reviews submitted by previous students. Specific exclusion and inclusion criteria for each article are reported in Table 1. The statistical values used in these studies were NNT, mean difference from baseline, ANOVA, and P values.

Table 1 – Demographics & Characteristics of included studies

Study	Type	#Pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Singh <sup>5</sup> (2011)	Randomized Control Trial	80	23-48 years old	Patients between the ages of 23 and 48 years old with RA, who were interested and able to participate in the yoga regimen	Patients uninterested or unable to participate in the yoga regimen and having more medical conditions	0	Yoga techniques to improve pain, inflammation, and stiffness. Yoga techniques: stretching (yoga poses) and meditation. 90 minute classes for 6 days a week for 7 weeks
Evans <sup>6</sup> (2013)	Randomized Control Trial	30	Average age 28.3 years old	Patients with a diagnosis of RA for at least 6 months with	Patients who are pregnant, were recently injured, have	4	“The intervention... consisted of 6 weeks of

				concomitant use of DMARDs, NSAIDs, and low-dose corticosteroids allowed as long as dose was stable for 4 weeks	a history of alcohol or drug abuse, <a href="#">or those who</a> received experimental medications in the past 6 months.		classes held twice per week. The classes were 1.5 hours in duration (total dose=18 h). A make up class was available at the end of the program.” <sup>6</sup>
Moona z <sup>7</sup> (2015)	Double Blind Randomized Control Trial	75	18 years and older	Patients who have been physically active for a maximum of 20 minutes <3 times per week, diagnosed with RA	Use of cane, walker, or wheelchair; diagnosis of another inflammatory condition; and surgery within 6 months	15	“8 weeks of yoga (2 60 min classes and 1 home practice/wk)” <sup>7</sup>

**OUTCOMES MEASURED**

The outcomes measured in all three studies were POEM’s that were evaluated in a variety of ways. Singh et al\_ measured changes in physical pain using the Simple Descriptive Pain Intensity Scale (SDPIS), which has participants rate pain intensity on a scale of 0 (no pain) to 5 (worst possible pain).<sup>9</sup>

Evans et al\_ measured health-related quality of life using SF-36, which assessed four scales\_ measuring bodily pain, general health, vitality, and mental health subscales.<sup>8</sup> Bodily pain was measured using the Pain Disability Index (PDI), which has patients rate their level of disability on a scale of 0 (most pain) to 10 (least pain).<sup>8</sup> Other scales measured include [the](#) Health Assessment Questionnaire Disability Index, DAS28, a measurement [of](#) disease activity, and [the](#) Global Improvement Scale, but this study focuses on the changes in the PDI.<sup>8</sup>

Moonaz et al. used a SF-36 Physical Component Summary (PCS), which measures physical function, fulfilling physical roles, and bodily pain.<sup>7</sup> A higher score on this scale denotes better health related qualities of life.<sup>7</sup> Standardized protocols were used to measure this, including a sit-and-reach box to measure flexibility, [ability to](#) balance [with](#) a one-leg stance, strength using a hand dynamometer, and walking capacity using a 6-min walk.<sup>7</sup>

## RESULTS

Singh et al. included [80](#) subjects, [56](#) females and [24](#) males between [the](#) ages of [23](#) and [48](#) years old. All of the participants completed the trial. The subjects were split into [a](#) control group and [a](#) participant group. The members of the control group were encouraged to continue taking their medications as prescribed. The participant group practiced yoga and meditation [90](#) minutes per day for seven weeks excluding Sundays. The instructors were all considered qualified yoga teachers. All of the participants in the study had a similar disease baseline prior to starting the study. Repeated-measure ANOVAs were conducted during this study, but the values were not presented in the article. The author does state that the repeated-measure ANOVAs showed a “statistically significant difference between two states (before and after) in pain intensity, number of inflamed joints, morning stiffness, PR, DBF, LC, CRP, and UA.” This study correlated with a P-value of less than 0.001 for pain intensity, inflamed joints, and morning stiffness, meaning a statistically significant improvement in pain from rheumatoid arthritis was achieved versus the control group.<sup>9</sup>

Table 2 – Baseline and post measurements on experimental and control groups related to selected parameters regarding RA. Values of group mean±SD<sup>9</sup>

Parameters	Control		Experimental	
	Before	After	Before	After
Pain intensity	2.03±0.7	1.92±0.76	1.90±0.84	0.20±0.516
Inflamed joints	3.25±1.24	2.38±1.55	3.38±1.31	0.43±0.64

Morning stiffness	81.68±21.65	55.88±22.90	76.25±20.56	13.15±17.18
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Evans et al. includes thirty patients of the average age of 28 years old. Only females were included in this study. Four patients dropped out of the study, but the losses to follow up for this study was less than 15%. Seven patients reported comorbid conditions including lupus, osteoarthritis, and epilepsy. Twenty one patients reported taking at least one disease-modifying anti-rheumatic drugs, seven reported taking nonsteroidal anti-inflammatory drugs, and five reported taking prednisone regularly, but both the control and experimental groups had a similar medication profile. The average years since diagnosis of rheumatoid arthritis was 10.6 for the all of the participants, but when the group was randomly divided into experimental and control groups, the experimental group's average years since diagnosis was 15.8 and the control group's was 6.8. The intervention consisted of 90-minute classes held twice a week for six weeks with a make-up class held at the end of the program. Each class had an experienced yoga teacher and assistant teacher teaching. Many different postures were taught in the classes and limitations were addressed as required on an individual basis. The members of the control group were instructed to continue their usual medical treatment and were offered yoga classes at the conclusion of the study. The author reported a t-score measured directly post intervention, which was -2.51 and a t-score measured at a two-month follow-up, which was -2.34. A P-value of 0.02 correlates with these scores, meaning the treatment effect is precise. The numbers needed to treat was calculated to be four, this positive number means four patients need to participate in yoga therapy in order for one person to experience a decrease in pain. Based on this number the treatment effect is large.<sup>8</sup>

Table 3 – Yoga and Control Group Differences on Primary and Secondary Outcomes

Variables	Yoga		Control		Effect (F)
	Baseline Mean (SD)	Post-mean (SD)	Baseline Mean (SD)	Post-mean (SD)	
SF-36: Bodily Pain	47.6 (25.8)	59.1 (19.2)	41.9 (25.4)	59.3 (26.4)	0.61

Table 4 – Changes in Primary Outcomes Following Yoga<sup>8</sup>

	Pretreatment Mean (SD)	Post-treatment Mean (SD)	Two-Month Follow-up Mean (SD)
SF-36 bodily pain (higher = less pain)	53.8 (26.5)	63.3 (25.3)	59.8 (27.4)

Moonaz et al. includes 75 participants over the age of 18 diagnosed with either rheumatoid arthritis or knee osteoarthritis. Eligible participants were required to only participate in 20 minutes of physical activity less than three times per week. Participants were excluded if they required use of a cane, walker, or wheelchair for mobility, were diagnosed with a comorbid inflammatory condition, or had surgery within 6 months of the study's start. Participants with rheumatoid arthritis were required to attain medical clearance in order to participate in this study. Seven participants withdrew from the study, but the losses to follow up were 22%. The individuals were randomly assigned to either experimental or control groups. The members of the experimental group participated in 60-minute classes held twice a week for eight weeks. A registered yoga therapist and faculty from Johns Hopkins Arthritis Center designed the yoga program, and two experienced yoga therapists taught the classes. The classes consisted of breathing exercises, isometric poses, and meditation. Participants were encouraged to practice poses at home and were given materials instructing proper ways to safely practice the poses. The members of the control group were instructed to continue the same level of physical activity, and members of both groups were instructed to continue taking their prescribed medications. The

mean difference from baseline of bodily pain measured at eight weeks was 9.6 with a P-value of less than 0.05, meaning that the treatment effect was large.<sup>7</sup>

Table 5 – Bodily pain by group at baseline and week eight of RCT<sup>7</sup>

Yoga (N=25)			
Variable	Week 0	Week 8	P-value
	52.2±18.9	63.1±20.6	0.015
Waitlist (N=28)			
Variable	Week 0	Week 8	P-value
	49.3±17.8	50.0±21.1	0.790
Week 8 Difference (95% CI)			
Variable	Unadjusted	Model 1*	Model 2**
	13.1 (25,23.7)	11.4 (2.6,20.2)	9.6 (0.5,18.7)

\*Model 1 adjusted for baseline value.

\*\*Model 2 adjusted for baseline value and age.

**DISCUSSION**

This study reviewed three randomized controlled trials in order to determine whether or not yoga therapy improves physical pain in patients with diagnosed rheumatoid arthritis. All three studies demonstrated a statistically significant improvement in pain and demonstrated P-values that were all less than 0.05, which indicates that the treatment effect is precise. These studies do not suggest that yoga therapy should be used alone to treat rheumatoid arthritis, but that yoga therapy, when used as an adjunctive therapy to traditional medical treatment of rheumatoid arthritis, will decrease physical pain.

Moonaz et al<sub>1</sub> showed the least significant improvement in pain of all three of the studies. This study included patients with knee osteoarthritis as part of the study, which could have skewed the suspected benefit that the patients with rheumatoid arthritis would see. This study also required the participants to practice yoga for the shortest amount of time, 60-minutes twice a

week. The other two studies had the participants taking 90-minute yoga classes six days a week or twice a week. Singh et al., which had participants practicing yoga the most frequently per week, had the most statistically significant improvement in pain of all three studies. It could be inferred that the more time spent practicing yoga, the more significant improvement in pain that occurs. It would be beneficial to study this further by comparing the improvement in pain in groups that practice yoga for different amounts of time each week.

These studies were female dominant, and further studies that include a more even gender ratio should be conducted. It may also be beneficial to conduct studies in order to determine the positions in yoga therapy that most benefit rheumatoid arthritis patients. This would allow individuals with rheumatoid arthritis to focus on specific positions that they know will improve their pain the most. All three studies excluded children and adolescents; therefore, a separate study focusing on whether yoga therapy improves physical pain in individuals with juvenile rheumatoid arthritis would be interesting.

Yoga therapy, although proven to be beneficial, does have its limitations, such as access to well-trained instructors, cost, and patient motivation to participate. Most individuals living in cities or large towns have access to a yoga studio, but individuals who live in more rural areas or individuals who do not have access to transportation may have difficulty accessing well-trained instructors. The cost of yoga therapy could also be a limitation to individuals. A single lesson can cost between \$12 and \$16 depending on the yoga studio.<sup>10</sup> Although this is not extremely expensive, the price would add up over time and could be a real burden to individuals.

## **CONCLUSION**

Yoga therapy is an effective adjunct to traditional medical treatment of individuals over the age of 18 with rheumatoid arthritis. The studies discussed in this systematic review show a

statistically significant improvement in physical pain in patients with diagnosed rheumatoid arthritis. These results indicated that practicing yoga with a trained instructor multiple times per week could improve pain in rheumatoid arthritis patients who continue to take all of their prescribed medications.

These studies did have some limitations that need further exploration. One of which was the fact that these studies were female dominant, and further investigation using a population that is more gender neutral would be beneficial. Also, expanding the studies to focus on specific positions that benefit participants the most would be helpful. A third area to explore more would be whether practicing yoga for longer or shorter times each week affects the pain alleviation in patients with rheumatoid arthritis. Lastly, a separate study exploring whether yoga therapy can reduce pain in children and adolescents with diagnosed juvenile rheumatoid arthritis would be enlightening.

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