

2019

# Does Yoga Improve Symptoms in Patients with Parkinson's Disease?

Victoria L. Starner

*Philadelphia College of Osteopathic Medicine*

Follow this and additional works at: [https://digitalcommons.pcom.edu/pa\\_systematic\\_reviews](https://digitalcommons.pcom.edu/pa_systematic_reviews)

 Part of the [Alternative and Complementary Medicine Commons](#), and the [Neurology Commons](#)

## Recommended Citation

Starner, Victoria L., "Does Yoga Improve Symptoms in Patients with Parkinson's Disease?" (2019). *PCOM Physician Assistant Studies Student Scholarship*. 502.

[https://digitalcommons.pcom.edu/pa\\_systematic\\_reviews/502](https://digitalcommons.pcom.edu/pa_systematic_reviews/502)

This Selective Evidence-Based Medicine Review is brought to you for free and open access by the Student Dissertations, Theses and Papers at DigitalCommons@PCOM. It has been accepted for inclusion in PCOM Physician Assistant Studies Student Scholarship by an authorized administrator of DigitalCommons@PCOM. For more information, please contact [library@pcom.edu](mailto:library@pcom.edu).

# **Does yoga improve symptoms in patients with Parkinson's Disease?**

Victoria L. Starner, 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, 2018

## ABSTRACT

**OBJECTIVE:** The objective of this selective EBM review is to determine whether or not yoga improved symptoms in patients with Parkinson's disease.

**STUDY DESIGN:** A systematic review of three peer-reviewed primary studies published between 2014 and 2018.

**DATA SOURCES:** Two randomized control trials and one before and after case study evaluating if yoga can improve symptoms for patients who are diagnosed with Parkinson's disease.

**OUTCOMES MEASURES:** The outcomes that were measured were balance and movement speed. Balance was measured using single leg balance test, single leg stance, and Berg Balance Scale. Movement speed, bradykinesia, was measured using the Unified Parkinson's Disease Rating Scale motor score (UPDRS).

**RESULTS:** In the study conducted by Boulgarides et al., they found that single leg bance (SLB) showed improvement nearing a significant value following the yoga intervention ( $p = 0.007$ ) and the Berg Balance Scale intervention period did not approach significance ( $p = 0.15$ ).<sup>1</sup> In the study conducted by Ni et al., single leg stance resulted in a lack of significant difference ( $p = 0.136$ ) and Berg Balance Score reproduced a clinically meaningful improvement ( $p = 0.000$ ) between the yoga intervention group and the control group.<sup>2</sup> In the study conducted by Ni et al., they found that differences in bradykinesia and mobility reached statistically significant improvement in the yoga intervention group when compared to the control group.<sup>3</sup>

**CONCLUSIONS:** The evidence presented in this review shows that yoga does improve symptoms in individuals with Parkinson's Disease. Significant results were found in each article with some variation to the test that yielded significant results. However, due to the small sample sizes and other limitations of these studies, the idea of yoga improving symptoms in patients diagnosed with Parkinson's disease should be further researched.

**KEY WORDS:** Yoga, Parkinson's Disease

## INTRODUCTION

Parkinson's Disease (PD) is a neurodegenerative disease that causes physical symptoms such as tremor, decreased motor control, and bradykinesia (slowed movement) caused by decreased dopamine availability due to a drop in pigmented neurons in the substantia nigra.<sup>1</sup> This paper evaluates two double blind, randomized, controlled trials and one before and after case study comparing the efficacy of yoga to improve movement and quality of life in geriatric patients with PD. PD has a prevalence of 0.5–1% in adults ages 65–69 years old, 1–3% in adults older than age 80; by the year 2020 there could be more than 40 million people worldwide with the disease.<sup>2,3</sup> With such a high prevalence, it is vital to research ways to slow the progression of PD symptoms that result from impairment in cognition and sensorimotor processing leading to immobility, falling, and the loss of independence.<sup>4</sup>

In the United States, Parkinson's disease accrues an estimated economic burden of \$14.4 billion per year with each patient's medical expenses being approximately \$22,800.<sup>5</sup> 57% of the medical cost is due to increased use of nursing home services and annually \$6.3 billion is due to missed work or job loss for the patient or caretaker and long-distance travel for appointments with a neurologist or movement disorder specialist.<sup>5</sup> Parkinson's Disease as a diagnosis but not the primary diagnosis had an estimated 27% of office visits, 23% outpatient, 47% of emergency room visits, and 14% of inpatient hospital days were closely related to PD.<sup>5</sup> Individuals with a secondary diagnosis of Parkinson's Disease remained hospitalized 9% longer.<sup>5</sup> Currently, the cause of PD is unknown although research is being done to get a clearer answer in order to work towards prevention or a cure.<sup>6</sup>

A cardinal symptom of Parkinson's disease is bradykinesia which is attributed to tremors, muscle weakness, and rigidity.<sup>2</sup> The symptoms arise due to a loss of dopamine-generating cells.<sup>7</sup>

Carbidopa levodopa is the medication used to most effectively treat symptoms of Parkinson's disease.<sup>6</sup> Dopamine agonists, MAO-B inhibitors, anticholinergics, and COMT inhibitors are medications used in combination with L-dopa to treat Parkinson's disease.<sup>7</sup> Occupational therapy, physical therapy, and speech therapy are all important in addressing gait disturbances, language barriers, and decreased fine motor skills in Parkinson's Disease.<sup>6</sup> Deep Brain Stimulation is a surgical option for individuals with Parkinson's Disease that have medication-resistant tremors.<sup>6</sup> Currently exercise regimens that focus on strengthening and balance, such as yoga, are not considered essential in the improvement of symptoms in individuals with Parkinson's disease. Yoga is an affordable and accessible exercise routine that can be easily incorporated into the lives of individuals of any age. This form of exercise should be considered an essential intervention implemented early into the treatment of individuals with Parkinson's Disease in order to help delay the progression of symptoms. Yoga's role in the relief of symptoms of PD such as balance, independence, and mood should be considered as opposed to the traditional non-exercise, medication-only regimens.

## **OBJECTIVE**

The objective of this selective EBM review is to determine whether or not yoga improved symptoms in patients with Parkinson's disease.

## **METHODS**

The types of studies included were two double blind, randomized controlled trials and one before and after case study. Online data sources were analyzed that included the key words Parkinson's and yoga. All the articles were published in English. All articles were published in peer-reviewed journals. The research and articles were found via personal research through Medline and Pubmed. A requirement was that the articles were published after the year 2008. Articles were

selected based on their relevance to my clinical question and if they included patient oriented outcomes (POEMS). Inclusion criteria were individuals diagnosed with Parkinson's Disease, outcomes that were patient oriented, articles that were published 2007 or later. Exclusion criteria were articles published prior to 2007 and review articles including other forms of secondary literature. A summary of statistics reported or used were p-value and change in mean from baseline. The outcomes that were measured were balance and movement speed. Balance was measured using single leg balance test, single leg stance, and Berg Balance Scale. Movement speed, bradykinesia, was measured using the Unified Parkinson's Disease Rating Scale motor score (UPDRS).

**Table 1: Demographics and Characteristics of Included Studies**

Study	Type	# Pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W /D	Interventions
Boulgariades <sup>1</sup> (2014)	Before and After Case Study	10	43-77	A Hoehn and Yahr stage of < 4.	Uncontrolled high blood pressure, dyspnea without exertion, cardiac symptoms, pain exacerbated by gentle movements, inability to follow simple instructions, or inability to attend 8 week yoga.	0	Individuals with PD participated in an 8 week adaptive yoga program.
Signorile JF <sup>2</sup> (2016)	Double Blind RCT	27	71.2 +/- 6.5	Older patients (60-90y) with idiopathic PD, Hoehn and Yahr Scale I-III, capable of ambulating for 50ft with or without an assistive device, rising from the floor with minimal assistance, with a score of 24 on the Folstein Mini-Mental State Exam	> stage III symptoms; progressive disease besides PD; spinal fusion or ortho surgery in past 6 months; severe visual deficits; major depression or dementia; greater than minimal assistance for gait and transfers; regular practice (1-2 times/wk) of yoga or resistance training in the past year.	4	2 high-speed exercise interventions (specifically designed yoga program) were given for 12 weeks (twice a week), and 1 nonexercise control group
Ni M <sup>3</sup>	Double	27	71.2	60-90 y/o, mild to	PD symptoms > stage	4	26 patients with

(2016)	Blind RCT		+/- 6.5	moderate PD (Hoehn & Yahr stages I–III), capable of ambulation 50 feet with or without an assistive device, able to get up and down from the floor with minimal assistance, the Folstein Mini-Mental State Examination score $\geq 24$ .	III on the Hoehn & Yahr Scale, a decline in immune function, or progressive degenerative disease; ortho surgery in past six months, inability to make scheduled YOGA or practice (1–2 times weekly) of yoga in past year		mild to moderate PD randomly assigned to a YOGA or control group (CON). YOGA program was 3 months, two sessions/wk of yoga classes
--------	-----------	--	---------	--	--	--	--

## OUTCOMES MEASURED

The criterion used for selection of studies was population including patients' age of 40 or greater with Parkinson's disease. The intervention was a yoga exercise program and it was compared to non-exercise control groups. Outcomes measured were balance and movement speed.

## RESULTS

This selective evidence based medicine review, which consisted of two randomized control trials and one before and after case study, assessed whether or not yoga could improve the quality of life for patients diagnosed with Parkinson's disease through a variety of outcomes. Three studies compared yoga intervention in Parkinson patients against a group that received no physical exercise intervention. All three trials were in adults greater than age 40 and each trial used continuous data. All three studies were in an outpatient setting with patients presenting with Parkinson's symptoms that affected their activities of daily living. Compliance rates were measured by attendance to scheduled yoga interventions for the entire duration of each study.

**Table 2: Efficacy of Yoga Intervention to Increase Unified Parkinson's Disease Rating Scale (UPDRS) Score, Single Leg Balance (SLB), and Berg Balance Score (BBS) in a Before and After Case Study Conducted by Boulgarides et al.<sup>1</sup>**

Study: Boulgarides et al. <sup>1</sup>	Initial Score	Post Control	Post yoga	p-value
--	---------------	--------------	-----------	---------

UPDRS (points)	39.3	39.7	40.2	0.69
SLB (seconds)	10.1	13.9	18.4	0.007*
BBS (points)	53.0	53.5	54.5	0.15
P value < 0.10 (approaches significant)				

In the study conducted by Boulgarides et al., a p value < 0.10 was considered to be approaching significance.<sup>1</sup> They assessed the efficacy of motor performance, activities of daily living, mobility, quality of life, and psychological status using the Unified Parkinson's Disease Rating Scale (UPDRS). The ANOVA analyses found that no mean differences approached significance at the more liberal level of  $\alpha = 0.10$  for the independent variable time of measure for the outcome variables UPDRS ( $p = 0.69$ ).<sup>1</sup> Single leg balance (SLB) showed improvement nearing a significant value following the yoga intervention ( $p = 0.007$ ).<sup>1</sup> Berg Balance Scale (BBS) measures balance and fall risk with participants rated between 0-4 on 14 items with a best possible score of 56.<sup>1</sup> The intervention period did not approach significance ( $p = 0.15$ ).<sup>1</sup>

Individuals with a Hoehn and Yahr stage of < 4 were included in the study conducted by Boulgarides et al.<sup>1</sup> In this study, individuals with uncontrolled high blood pressure, dyspnea without exertion, cardiac symptoms, pain exacerbated by gentle movements, inability to follow simple instructions, or inability to attend an 8 week yoga program were excluded.

The experimental group for the study conducted by Boulgarides et al. consisted of ten participants who were observed in an eight week control phase and then again after an eight week adaptive yoga program to compare the changes in strength, flexibility, motor control, balance, function, anxiety, and depression.<sup>1</sup> Of the ten participants, zero of them withdrew from the study.<sup>1</sup> When compared to the control period, single leg balance test approached significant.<sup>1</sup>



The Berg Balance score did not reach significant change when the before and after interventions scores were compared.<sup>1</sup>

**Table 3: Efficacy of Yoga Intervention to Increase Unified Parkinson's Disease Rating Scale (UPDRS) Score, Single Leg Stance (SLS), and Berg Balance Score (BBS) in a Randomized Control Trial Study Conducted by Signorile et al.<sup>2</sup>**

Study: Signorile et al. <sup>2</sup>	Baseline	Changes at 3 month time point	p-value
UPDRS	28.15 +/- 11	-10.9 (-14.0 to -7.8)	0.000*
SLS (seconds)	9.24 +/- 7.4	17.7 (-0.3 – 35.8)	0.136
BBS	49.22 +/- 3.9	4.2 (2.4 – 5.9)	0.000*

Values are mean SD, mean (95% CI)  
P value of .05 was required to establish significance\*

In the study conducted by Signorile et al., a confidence interval of 95% and a p value of 0.05 were required to establish significance.<sup>2</sup> Yoga training produced statistically significant results in the Unified Parkinson's Disease Rating Scale suggesting these interventions can reduce Parkinson's Disease symptoms and improve movement function ( $p = 0.000$ ).<sup>2</sup> The Single Leg Stance resulted in a lack of significant differences in the yoga group compared with controls ( $p = 0.136$ ).<sup>2</sup> This may have been due to the large variability between subjects.<sup>2</sup> The age characteristics of the participants were 71.2 +/- 6.5 for the yoga group and 74.9 +/- 8.3 for the control group.<sup>2</sup> The Berg Balance Score reproduced a clinically meaningful improvement ( $p = 0.000$ ) between the yoga intervention group and the control group.<sup>2</sup>

In the study conducted by Signorile et al., older patients (60-90 years) with idiopathic PD, Hoehn and Yahr Scale I-III, capable of ambulating for fifty feet with or without an assistive device, rising from the floor with minimal assistance, with a score of twenty-four on the Folstein Mini-Mental State Examination were included.<sup>2</sup> The study excluded above stage III symptoms; progressive degenerative disease besides Parkinson's Disease; spinal fusion or orthopedic surgery in the past six months; severe visual deficits; major depression or dementia; greater than

minimal assistance for gait and transfers; regular practice (1-2 times per week) of yoga or resistance training in the past year.<sup>2</sup>

The study conducted by Signorile et al. compared a twelve week yoga intervention group to a non exercise control group.<sup>2</sup> The trial found that significant changes were seen between the yoga intervention group and the control group for the scores on the Unified Parkinson's Disease Rating Scale and Berg Balance Score.<sup>2</sup> Single Leg Stance was not found to have significant differences between the intervention and control group.<sup>2</sup> This study analyzed twenty seven individuals and four dropped out by the end of the study.<sup>2</sup>

**Table 4: Efficacy of Yoga Intervention to Improve Upper and Lower Limb Bradykinesia and Mobility in a Randomized Control Trial Study Conducted by Ni et al.<sup>3</sup>**

Study : Ni et al. <sup>3</sup>	Pre-test	Changes at post-test	Effect size g (95% CI)	p-value
Bradykinesia (Upper limbs)	9.2	-4.5	-1.75	0.000*
Bradykinesia (Lower Limbs)	6.5	-2.5	-1.11	0.000*
Mobility	14.5	-5.6	-0.82	0.025*
95% Confidence Interval P < 0.05 was required to establish significance				

In the study conducted by Ni et al., a 95% confidence interval and a P < 0.05 was considered significant which was adjusted for baseline values based on ANCOVA.<sup>3</sup> Bradykinesia of the upper and lower limbs were measured using the UPDRS.<sup>3</sup> The pre-test, changes in the post-test and the treatment effect resulted in significant change from baseline (p = 0.000).<sup>3</sup> Yoga intervention was deemed to have a significant improvement on mobility (p = 0.025).<sup>3</sup>

The inclusion criteria in the study conducted by Ni et al. were that the individuals were 60–90 years old with mild to moderate PD (Hoehn & Yahr stages I–III), capable of ambulating for 50 feet with or without an assistive device, able to get up and down from the floor with

minimal assistance, the Folstein Mini-Mental State Examination score  $\geq 24$  to ensure they could understand the requirements during testing and training.<sup>3</sup> The study excluded Parkinson's Disease symptoms greater than stage III on the Hoehn & Yahr Scale, a decline in immune function such as pneumonia or systemic infection, or progressive degenerative disease; orthopedic surgery in past six months, inability to make time commitments to the scheduled yoga or engaging in practice (1–2 times weekly) of yoga with in the past year.<sup>3</sup>

This study assessed individuals that were randomly divided into a control group and a group that received yoga interventions.<sup>3</sup> They found that differences in bradykinesia and mobility reached statistically significant improvement in the yoga intervention group when compared to the control group.<sup>3</sup> The study conducted by Ni et al. began with twenty seven participants and lost four.<sup>3</sup> Two individuals discontinued interventions for unspecified reasons and two were lost to follow up.<sup>3</sup>

## **DISCUSSION**

This study reviewed two randomized control trials and one before and after study in order to determine whether or not yoga therapy improves symptoms in individuals with Parkinson's Disease. Symptoms of Parkinson's Disease can be debilitating to an individual's ability to complete activities of daily living. Exercise is known to improve quality of life although, more specifically, this evidence based medicine review looks at whether or not symptomatic improvement was accomplished. Disturbances in balance, while frustrating to the individual, may result in dangerous, life threatening complications in an older individual if they do not have adequate home support. Yoga therapy is a cost-effective intervention that is safe and tolerable and may have beneficial results when used as adjunctive therapy to medications, occupational therapy, speech therapy, and physical therapy. Fifty percent of participants from the before and

after study conducted by Boulgarides et al. continued yoga intervention after the completion of the study.<sup>1</sup>

The study conducted by Signorile et al. aimed to investigate the effects of yoga training on physical function in individuals with Parkinson's Disease by incorporating high-speed, multidirectional transitions using bodyweight and kinetic movement chains.<sup>2</sup> Symptoms such as balance, bradykinesia, mobility, and those measured on the Unified Parkinson's Disease Rating Scale had some degree of improvement in one of the three peer-reviewed primary studies. If yoga interventions can be initiated while individuals with Parkinson's Disease are mobile and physically able to engage, long term benefits may include increased balance, mobility, and decreased bradykinesia leading to prolonged independence with functionality and reduction in fall probability.

### **Limitations**

Measuring the improvement in Parkinson's Disease is difficult due to the wide range of symptom presentations and various medical treatments that are available. The study conducted by Boulgarides et al. showed that given the high initial mean score of the Berg Balance scale (53.0 out of 56), the lack of change may have also been due to a ceiling effect.<sup>1</sup> In this before and after study, the individuals began with a high initial score and therefore did not experience much change when the control period and post yoga intervention period were compared.<sup>1</sup> Due to the variability in disease states of individuals with Parkinson's Disease, there was a variety of the magnitude of improvement for certain tests which may have had an effect on the interpretation of the results.<sup>2</sup> In the future, studies should evaluate the disease state, treatment effect, and the interaction between the two.<sup>2</sup> Small sample sizes also may have affected the interpretation of the

results and further studies should attempt to increase the number of individuals assessed with Parkinson's disease undergoing yoga interventions.<sup>2,3</sup>

## CONCLUSIONS

The intervention of yoga therapy compared to an absence of a yoga routine did show improvement in symptoms in individuals with Parkinson's Disease. Yoga therapy is a cost effective intervention that is safe and tolerable in individuals of varying ages with Parkinson's Disease. Significant results were found in each reviewed article with some variation to the test that yielded significant results. Participants in these studies saw improvement in balance, bradykinesia, Unified Parkinson's Disease Rating Scale scores, and mobility. It is an effective intervention that may be used as adjunctive therapy to medications, occupational therapy, speech therapy, and physical therapy. There were some flaws in the methods such as the small sample sizes and short duration of the study time. Further studies should follow individuals for longer periods of time to assess disease progression because while improvements of symptoms is ideal, slowing the progression of Parkinson's Disease would be the most beneficial to longevity of individuals with PD. Parkinson's Disease symptoms have a wide fluctuation due to medication changes, time of day, and general deterioration so these may all be aspects to include in future studies.

## References

1. Boulgarides LK, Karakatt E, Coleman-Salgado B. Measuring the effect of an eight-week adaptive yoga program on the physical and psychological status of individuals with parkinsons disease. *International Journal of Yoga Therapy*. 2014;24(31-41).
2. Signorile JF, Ni M, Mooney K, et al. Comparative effect of power training and high-speed yoga on motor function in older patients with parkinson disease. *Archives of Physical Medicine and Rehabilitation*. 2016;97(3):354.e15.
3. Ni M, Signorile JF. Controlled pilot study of the effects of power yoga in parkinson's disease. *Complementary Therapies in Medicine*. 2016;25:126.
4. Avanzinoa L, Lagravinesea G, et al. Relationships between gait and emotion in Parkinson's Disease. *Gait & Posture*. 2018;65(57-64).
5. Kowal S, Dall T, Chakrabarti R, et al. The current and projected economic burden of parkinson's disease in the United States. *Movement Disorders*. 2013;28(311-318).
6. Common Symptoms of Parkinson's Disease. American Parkinson's Disease Association Website. <https://www.apdaparkinson.org/what-is-parkinsons/symptoms/>. Accessed on October 1st, 2018.
7. Parkinson's Disease Fact Sheet. National Parkinson Foundation's Aware In Care. [https://www.parkinson.org/sites/default/files/FactSheet\\_051616.pdf](https://www.parkinson.org/sites/default/files/FactSheet_051616.pdf). Accessed October 1st, 2018.