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**Can Tango Help Improve Quality of Life for Patients with
Parkinson's Disease?**

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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
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ABSTRACT

OBJECTIVE: The objective of this selective EBM review is to determine whether or not tango can help improve the quality of life for patients with Parkinson's Disease.

STUDY DESIGN: A systematic review of three peer-reviewed primary studies published between the years of 2013 and 2015.

DATA SOURCES: Two randomized control trials and one non-randomized control trial evaluating if tango can improve the quality of life for patients who are diagnosed with Parkinson's disease. Sources were selected from PubMed and Google Scholar based off of the relevance to the clinical question and outcomes being patient oriented.

OUTCOMES MEASURED: The outcomes measured in each of these trials affect patients who are diagnosed with Parkinson's disease in regards to their quality of life. These outcomes include: motor severity measured by Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS-3)⁶, every day fall incidence measured by everyday fall incidence outside of class⁷, and participation of new activities measured by the Activity Card Sort⁸.

RESULTS: The study conducted by Foster et al. ⁸ showed significant improvement in the onset of new activities (p=0.003) for the patients who were in the experimental tango group. However, the other two studies conducted by Rios Romenets et al,⁶ evaluating motor severity, and by McKee et al.⁷, evaluating every day fall incidences, did not have significant findings.

CONCLUSIONS: The evidence presented in this review is inconclusive as to whether or not tango can improve the quality of life for patients diagnosed with Parkinson's disease. Only one study had significant results (Foster et al.⁸), whereas the other two studies did not have significant findings. However, due to the limitations of these studies, the concept of tango improving the quality of life for patients diagnosed with Parkinson's disease should not be ruled out. Further research is warranted.

KEY WORDS: Tango, and Parkinson's disease

INTRODUCTION

Parkinson's disease is a progressive movement disorder that affects the central nervous system. Clinical manifestations of Parkinson's disease include both motor and non-motor symptoms. The most prominent motor symptoms include pill rolling hand tremors, bradykinesia, muscle rigidity, balance disturbances, and a shuffling gait¹. Non-motor symptoms can include depression, delusions, and anxiety¹. It is a complex disease that is not fully understood, but often leads to devastating outcomes. As Parkinson's disease continues to progress, patients may find that they lose much of their independence due to the extreme difficulty in performing activities of daily life. Overall, many patients with Parkinson's disease can experience a decrease in their quality of life.

Physician assistants have the ability to manage Parkinson's disease in a variety of settings. The incidence of Parkinson's disease increases with age². It is estimated that Parkinson's disease affects approximately 1 million Americans and 10 million people world-wide². There are roughly 60,000 Americans diagnosed every year and it is most commonly seen in patients over the age of 50². Parkinson's disease is estimated to cost \$14.4 billion a year in the United States³. While it varies from patient to patient, on average, patients diagnosed with Parkinson's disease should visit their neurologist at least two to four times per year to receive proper management of their symptoms⁴.

Parkinson's disease is thought to occur due to neuronal degeneration in the substantia nigra, which leads to a decrease in dopamine¹. This persistent decrease in dopamine leads to difficulty in neuronal communication to regions of the brain which control motor movements¹. Furthermore, the decreased levels of dopamine can lead to an imbalance between dopamine and acetylcholine levels in the brain, which is thought to also contribute to the motor manifestations.

The most prominent motor symptoms, which typically include tremor, bradykinesia, and muscle rigidity, start to appear when approximately 60-80% of dopamine producing cells are impaired or damaged¹.

While there is some understanding of the pathophysiology of Parkinson's disease, there are still many of unknown factors. The exact cause of Parkinson's disease is unknown and is more often than not diagnosed as an idiopathic disease. While symptomatic treatment is available, there is no known cure for Parkinson's disease.

Treatment for Parkinson's disease varies case by case. Typically, the first line treatment includes pharmacologic therapy. Pharmacologic treatment options include: carbidopa-levodopa, dopamine agonists, MAO-B inhibitors, catechol-O-methyltransferase (COMT) inhibitors, anticholinergics, and amantadine⁵. Surgical interventions, such as deep brain stimulation (DBS), may be used in later cases for some patients who have poor responses to pharmacological therapy⁵.

As stated above, patients with Parkinson's disease suffer from gait disturbances that can affect their quality of life. Tango is thought to have the potential to improve balance and functional mobility, along with allowing participants to have the opportunity to socialize and interact in group activities. Therefore, it is thought that tango may help improve quality of life for patients with Parkinson's disease by improving motor severity, decreasing fall incidence, and increasing participation in activities

OBJECTIVE

The objective of this selective EBM review is to determine whether or not tango can help improve the quality of life for patients with Parkinson's Disease.

METHODS

The three studies used in this systematic review included two randomized control trials and one non-randomized control trial. The studies evaluated if tango can improve the quality of life in patients who have Parkinson's disease by evaluating a variety of outcomes. Populations for each study were compared to a control group. Outcomes measured included motor severity⁶, decreased fall incidence⁷, and increased participation in activities⁸. Control groups included self-directed exercises⁶, an interactive health education series group⁷, and no intervention⁸. Inclusion criteria for all three studies included both male and female participants who were diagnosed with idiopathic Parkinson's disease, articles that were published in 2006 or later, outcomes that were patient oriented (POEMs, and tango being the only intervention for the experimental group. Exclusion criteria included articles that were published before the year 2006 and outcomes that were not patient oriented (POEMS).

The keywords "tango" and "Parkinson's disease" were used and sources were selected from PubMed and Google Scholar based off of relevance to the clinical question and that the outcomes were patient oriented (POEMS). The articles were published between 2013 and 2015, and were published in English language. The statistics reported included P-value, Mean, and confidence interval (CI). Table 1 shows the demographics and characteristics of included studies.

Table 1 - Demographics & Characteristics of included studies

Study	Type	# Pts	Age (yrs.)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Rios Romenets, (2015) ⁶	RCT	33	Mean age: 64.3	-Participants must be diagnosed idiopathic PD with Hoehn and Yarh stage I-III. ⁶ -Participants must speak English or French. ⁶	-Participants that could not stand for at least 30 minutes or walk for at least 3 meters could not participate ⁶ . - Participants with dementia, severe hearing or vision problems, or other serious medical conditions could not participate ⁶ . - Participants who had more than 3 falls within last 12 months could not participate ⁶ .	2	-Partnered tango classes twice a week for 12 weeks ⁶ .
Mckee (2013) ⁷	Non-RCT	33	Age: 50+ Mean age: 68.4	- Participants must be diagnosed idiopathic "definite" PD with Hoehn and Yarh stage I-III without previous neurological insult ⁷ . - Participants were age 50+ ⁷ . - Participants could walk for at least 3 meters ⁷ .	- No exclusion criteria provided.	2	-Twenty, 90-minute tango dance classes over 12 weeks ⁷ .
Foster (2013) ⁸	RCT	52	Mean age: 69.3	- Participants must be diagnosed idiopathic PD with Hoehn and Yarh stage I-IV ⁸ . - Participants must experience benefit from levodopa ⁸ . -Participants must be able to walk for 10 feet ⁸ .	-Participants must not have any neurological defects, serious medical problems, abnormal brain imaging, or musculoskeletal problems not related to Parkinson's disease ⁸ .	17	-12-month community based tango dance program ⁸ .

OUTCOMES MEASURED

Outcomes measured were patient oriented (POEMS) and varied by each study. Rios Romenets et al.⁶ used motor severity measured by the Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS-3). McKee et al.⁷ used every day fall incidence measured by everyday fall incidence outside of class. Foster et al.⁸ used participation of new activities measured by the Activity Card Sort.

RESULTS

This review, which consisted of two randomized control trials and one non-randomized control trial, assessed whether or not tango could help improve the quality of life for patients diagnosed with Parkinson's disease through a variety of outcomes. All three trials used continuous data.

In the study conducted by Rios Romenets et al.⁶, 40 participants were screened and 33 participants were randomly distributed into one of two groups via a random number generator. Participants were placed into either the experimental group, which was tango dance therapy (n=18), or the control group, which was self-directed exercise therapy (n=15)⁶. Inclusion criteria for participants required that they must be diagnosed with idiopathic PD with Hoehn and Yarh stage I-III and must speak English or French⁶. Exclusion criteria participants who could not stand for at least 30 minutes or walk for at least 3 meters, participants who had more than three falls within the last 12 months, and participants with dementia, severe hearing or vision problems, or other serious medical conditions⁶. Participants in the experimental group attended one hour partnered tango classes at a dance studio twice a week for 12 weeks⁶. The control group was given a pamphlet, "Exercises for people with Parkinson's", from the Parkinson Society of

Canada, and were instructed to practice the exercises at home daily⁶. The participants were instructed to follow any existing exercise classes but not to start any new exercise or dance programs⁶. Motor severity was evaluated by the Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPRDS-3)⁶.

Out of the 33 participants that were randomized, two dropped out of the control group. One patient dropped out due to a relapse in radiculopathy and a second participant dropped out without explanation⁶. There were a total of nine protocol violations by six participants who failed to attend at least 50% of the classes, and one patient doubled their dose of levodopa during the study⁶.

Overall, the tango dance classes were well tolerated. Adverse events included falls (7% in the control group, 11% in the tango group), one respiratory infection (not related to the tango classes), and one participant who reported some fatigue and muscle cramps⁶.

The results of this study concluded that there was not a significant difference in the tango group when compared to the control group using the Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPRDS-3) ($P=0.66$)⁶. While the results were not significant for motor severity, there seemed to be some improvement in other areas that may affect quality of life such as balance, fatigue, and cognition⁶.

Table 2: Efficacy of Tango dance to decrease motor severity measured by the Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPRDS-3) conducted by Rios Romenets et al.⁶

Study: Rios Romenets et al. ⁶	P
Tango group compared to control group in motor severity	0.66

In the study by Mckee et al.⁷, 33 participants were assigned to either an experimental or control group. Over a 12-week period, the experimental group of participants attended twenty, 90-minute tango classes (n=24), while the control group attended 90-minute sessions of education seminars and lectures (n=9)⁷. The tango classes were taught by nine instructors who followed the same instruction dance manual, and all participants were paired with a partner who did not have Parkinson's disease⁷. Participants in the tango group were instructed not to practice tango outside of their classes. The education group attended an hour of lecture followed by a half hour of structured activities or further discussion of topics⁷.

The study was a non-randomized control trial. The following list is the inclusion criteria for participants: a patient with a diagnosis of idiopathic Parkinson's disease who had benefited from anti-parkinsonian medications, no previous neurologic insult, age 50 or older, and the ability to walk for at least 3 meters either assisted or unassisted⁷. No exclusion criteria was provided. This study used every day fall incidences outside of class to measure every day fall incidences⁷. To further explain, this study measured the number of falls that occurred outside of class in the tango group and compared that to the number of falls that occurred in the control group.

Out of 33 participants, 23 tango participants and eight education participants completed all 20 classes⁷. Two participants, one from the tango group and one from the control group, withdrew from the study prior to the start of classes due to reasons the authors did not disclose. Overall, the tango classes were well tolerated. There were two in-class falls for the tango group, both of which were non-injurious, and the participants resumed the class after a mandatory rest time⁷. There were no falls in the education group.

The results of the study did not show a significant difference in the decrease in every day fall incidence between the tango and control group (CI (0.02-111.5), $p=0.724$)⁷. While the results are not considered statistically significant, there was still a slight improvement in number of falls noted in the tango group. When compared to the control group, the tango group participants were 1.42 times more likely to have a decrease in falls or experience no change in fall incidence compared to the year before⁷. It was found that in participants who improved their balance, 66 percent of the tango group and 50 percent of the education group experienced decreased or no change in fall incidence⁷.

Table 3: Efficacy of Tango dance to decrease every day fall incidences measured by every day fall incidences conducted by Mckee et al.⁷

Study: Mckee et al. ⁷	CI	P
Tango group compared to control group in fall incidence	0.02-111.5	0.724

In the study by Foster et al.⁸, 52 participants were randomly assigned to either an experimental tango group (n=26) or a control group (n=26). The experimental tango group consisted of a 12-month community based tango program where participants attended lessons twice a week.⁸ The control group did not receive any intervention. Inclusion criteria for the study required that participants must be diagnosed idiopathic PD with Hoehn and Yarh stage I-IV, be able to walk 10 feet, and must experience benefit from levodopa⁸. Exclusion criteria included that participants must not have any neurological defects, serious medical problems, abnormal brain imaging, or musculoskeletal problems not related to Parkinson's disease⁸. The outcome

evaluated by this study was to assess if there was an increase in new activities, measured by the Activity Card Sort⁸.

Over the 12-month period of this study, 80% of participants in the tango group attended all of the classes⁸. There were 10 participants from tango group and seven participants from the control group who withdrew or were lost to follow up⁸. The reasons stated for discontinuing intervention for both groups included scheduling conflicts, deep brain stimulation surgery, family issues, physical decline, and not wishing to continue⁸. There were no adverse events or injuries noted⁸.

The results were found to be significant ($M=0.5$, $P<0.001$) when comparing a change from baseline at 3, 6, and 12 months for an increase in new activities⁸.

Table 4: Efficacy of Tango dance to increase new activities for patients with Parkinson's disease measured by the Activity Slot Card conducted by Foster et al. ⁸.

Study: Foster et al. ⁸	M	P
Tango	0.5	<0.001
Control	0.15	>0.31

Safety and tolerability

As previously noted in the results section, tango was well tolerated overall across all studies. There were no serious injuries or adverse events noted during the interventions.

DISCUSSION

Parkinson's disease can present with motor manifestations that can severely impact a person's quality of life. The objective of this selective EBM review is to determine whether or not tango can help improve the quality of life for patients with Parkinson's Disease. One of the

three studies, conducted by Foster et al.⁸, showed to improve quality of life in patients with Parkinson's disease by increasing new activities. This significant finding may show hope towards future research involving Parkinson's disease and tango.

Tango has the potential to be available throughout the world and come with little risk to the participants. Classes could be easily accessible for patients diagnosed with Parkinson's disease if offered in a variety of settings such as community centers, rehabilitation centers, retirement communities, and nursing homes. Different insurances may or may not cover "exercise", for which tango may or may not qualify. While the mean age range of participants for these studies was 64.3-69.3 years old, tango can be performed by a wide variety of ages. Overall, tango is a relatively safe and well tolerated intervention.

Limitations

A trial of tango was evaluated by the three studies to assess if there could be a potential benefit of quality of life for patients with Parkinson's disease. While the results were inconclusive with one study having significant improvement and the other two studies resulting in insignificant findings, tango should not be ruled out for benefitting patients with Parkinson's disease. There were several limitations to these studies which may have influenced the results.

In the study by Rios Romenets et al.⁶, there were multiple limitations. The study was limited to a small population with only 33 participants. Additionally, within those 33 participants there were two people who withdrew or were lost to follow up and six out of eighteen of the participants missed fifty percent or more of the tango classes⁶. Additionally, raters were not blinded for the study and there was no verification that the control group actually completed their exercises⁶.

In the study by Mckee et al.⁷, there were a few limitations noted as well. There was a slight difference in age between the tango and control group, with the control group slightly older⁷. Another limitation to this study was that it was a non-randomized control study. Therefore, participants knew what group they were assigned to and may have had bias towards one group over another⁷. Additionally, the instructors who taught that dance classes may have exhibited different personality traits which may have affected the participant's performance⁷.

In the study conducted by Foster et al.⁸, which measured increase in new activities, there was no control for socialization between the tango group and the control group. The author admits that the lack of control for socialization may have led to the improvement in the tango group through non-specific effects of socializing⁸.

CONCLUSION

The evidence presented in this review is inconclusive as to whether or not tango can improve the quality of life for patients diagnosed with Parkinson's disease. The study conducted by Foster et al.⁸ showed significant improvement in the onset of new activities ($p=0.003$, $M=0.5$) for the patients who were in the experimental tango group, while the other two studies did not have significant improvement in outcomes. However, due to the limitations of these studies, the concept of tango improving the quality of life for patients diagnosed with Parkinson's disease should not be excluded. Future research is warranted and may possibly benefit from including a widened variety of control groups, such as other forms of instructed dance or physical activity. Future studies should also have more controlled variables and attention to detail in the study design to avoid some of the limitations stated above. Overall, while the results of this review were inconclusive, tango may have potential for improving the quality of life for patients with Parkinson's disease.

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