

# Effect of Osteopathic Manipulative Treatment on Gait and Balance in Patients With Parkinson's Disease

Matthew Barker, DO, Kendi Hensel, DO, PhD, FAAO, Evan Papa, PT, DPT, PhD, Rita M. Patterson PhD

Department of Osteopathic Neuromusculoskeletal Medicine- Medical City Fort Worth in Fort Worth, TX 76107  
Department of Osteopathic Manipulative Medicine- UNT Health Science Center in Fort Worth, TX 76107

## Background

### Parkinson's Disease (PD):

- Second most common neurodegenerative disease.
- Pathophysiology is characterized by a lack of dopamine in the basal ganglia affecting the connections to the thalamus and motor cortex.
- Common symptoms: tremor, rigidity, bradykinesia and postural instability.

### Falls in People with PD:

- People with PD are 2 times more likely to fall than people with other neurologic conditions<sup>1</sup> and 3-9 times more likely to fall when compared to healthy older adults.
- Risk factors associated with falls: history of falls, postural instability, gait freezing, leg weakness, and cognitive impairment<sup>1</sup>.
- The Functional Reach (FR) Test distance (Figure 6) has demonstrated to be predictive of fall risk in elderly persons<sup>2</sup>.
- The Timed Up and Go (TUG) test includes a sit-to-stand component and then walking 3 meters, turning, and then returning to their chair and is used to measure basic mobility skills of elderly individuals or those with neurologic conditions<sup>3</sup>.

Osteopathic Manipulative Treatment (OMT) could potentially improve gait and balance in people with PD.

- OMT has shown to improve postural control in healthy older subjects<sup>4</sup>.
- The effects of OMT on people with PD have previously shown a positive effect on gait kinematics<sup>5</sup>. However, they did not examine static components of postural control, which are the most common cause of falls in PD<sup>6</sup>.

## Experimental Design and Methods

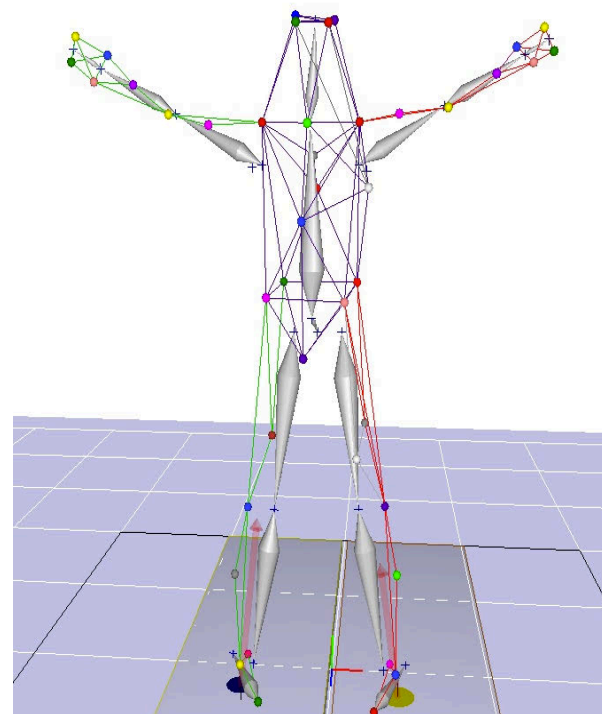
- **Study type:** Randomized controlled trial
- **Hypothesis:** OMT will improve gait and balance in individuals with PD
- **Study Outcomes:** Timed Up and Go (TUG) test and Functional Reach (FR) Test (Figure 6)
- **Experimental design:** Individuals with PD and age matched healthy participants were randomly assigned to one of three treatment groups (Figure 1). The main outcomes were measured before and after receiving their designated treatment.
- All OMT and Sham OMT was performed by board certified Osteopathic Manipulative Medicine (OMM) specialists.

Participants	Whole Body OMT	Neck Down OMT	Sham OMT	Total Participants
PD Participants	13	13	13	39
Control Participants	7	7	6	20
Treatment Group Totals	20	20	19	59

(Figure 1: Breakdown of the three treatment arms)



(Figure 2: Participant standing on the V-Gait CAREN System, a Computer Assisted Rehabilitation Environment Network that integrates traditional instrumentation of investigating posture and gait with a virtual reality environment - Motek ForceLink, Amsterdam, Netherlands)



(Figure 3: A 12-camera motion analysis system digitally tracks reflective markers placed on the participants' body, allowing calculation of kinematics, joint range of motion, and gait parameters.)

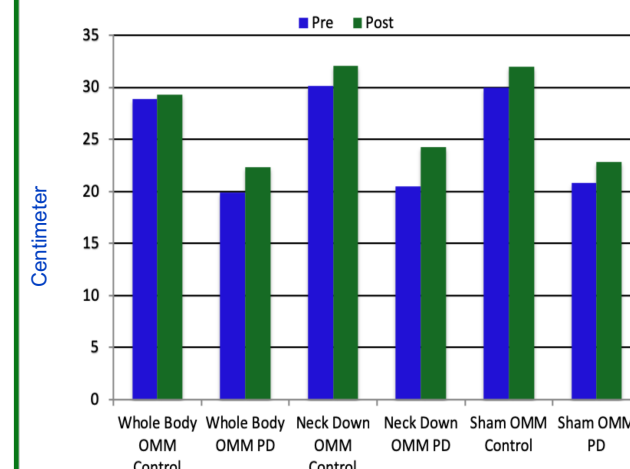
## Results

Analysis of variance was performed on the clinical data.

The results showed:

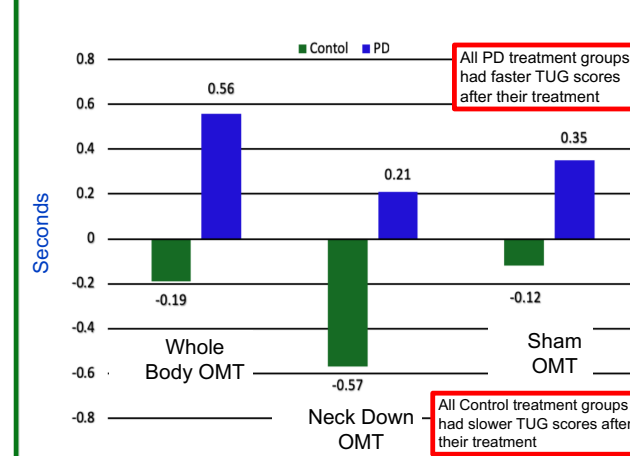
- A significant difference between the PD participants and the Control participants initial TUG (PD = 8.89, C = 6.16) and FR scores (PD = 20.38 cm, C = 29.65).
- A significant improvement in the pre-treatment vs post-treatment FR scores for both Control and PD participants. The post-treatment change in FR for PD was 2.55 cm and for C was 1.47 cm (Figure 4).
- No significant changes between any of the treatment groups or between the pre and post-treatment TUG scores (Figure 5).

### Functional Reach Pre vs. Post Treatment



(Figure 4)

### Change in TUG Pre vs. Post Treatment

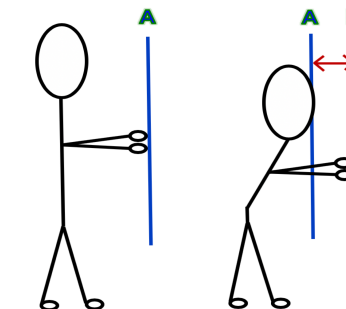


(Figure 5)

## Conclusion

- As expected, PD participants had slower TUG times and could reach a shorter distance in the FR test compared to control subjects. The significant improvement in functional reach post-treatment could indicate a learning curve, as there was no significant difference between treatment groups.
- The results do not support our hypothesis as there was no statistical significance between any of the treatment groups for the outcomes measured.
- Participant fatigue could have been a significant factor for the results obtained as all testing was completed in the same day. It is also possible that the effect of an OMT session may not be fully achieved immediately after the treatment was received. More significant results may have been found if the re-assessment was done at a follow up appointment instead of the same day.
- Other limitations of the current study:
  - Relatively small sample size.
  - Nearly half of the PD participants did not have an age matched control.
  - This was a single treatment session vs. multiple treatment sessions.
- This trial is still in data collection, so this only represents a subset of the data that will be collected.

### Functional Reach Test



(Figure 6: Illustration of the functional reach test. The distance between lines A and B is the functional reach score, measured in centimeters.)

## Acknowledgements

This study was approved by UNT Health Science Center's Institutional Review Board (ID #2016-097). Funding was received from the American Osteopathic Association (AOA). Thank you to all of the contributing faculty and research support staff at UNT Health Science Center.

## References

1. Allen NE, et al. Recurrent falls in Parkinson's Disease: a Systematic Review, Parkinson's Disease. (2013) 906274
2. Brusse KJ, et al. Testing Functional Performance in People With Parkinson Disease. (2005) 85(2):134-141.
3. Huang, et al. Minimal Detectable Change of Timed "Up & Go" Test and the Dynamic Gait Index in People With Parkinson Disease. Physical Therapy (2011) 91 (1): 114-121.
4. Lopez D, et al. Effects of Comprehensive Osteopathic Manipulative Treatment on Balance in Elderly Patients: a Pilot Study. JAOA. (2011) 111(6):382-388.
5. Wells MR, et al. Standard Osteopathic Manipulative Treatment Acutely Improves Gait Performance in Patients with Parkinson's Disease. JAOA (1999) 99 (2), 92-98
6. Rudzinska, M., et al. Causes and Risk Factors of Falls in Patients With Parkinson's Disease. Neurol Neurochir Pol (2008) 42(3): 216-222