



REPETITIVE FINGER MOVEMENT IN PEOPLES WITH PARKINSON'S DISEASES FOLLOW-UP STUDY

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INTRODUCTION



- The performance of repetitive finger movements is a clinical tool used to assess severity, progression, and treatment efficacy of Parkinson's disease (PD) and related disorders.



- Impaired control of repetitive finger movements can significantly impact the performance of daily living activities, such as writing and buttoning clothing.



- Early on movement disorders often have overlapping clinical features and present with similar deficits in repetitive finger movements, making diagnosis difficult.

- Persons with PD demonstrate movement festination at rates near to and above 2 Hz which is NOT improved with dopaminergic medication (Figure 1).

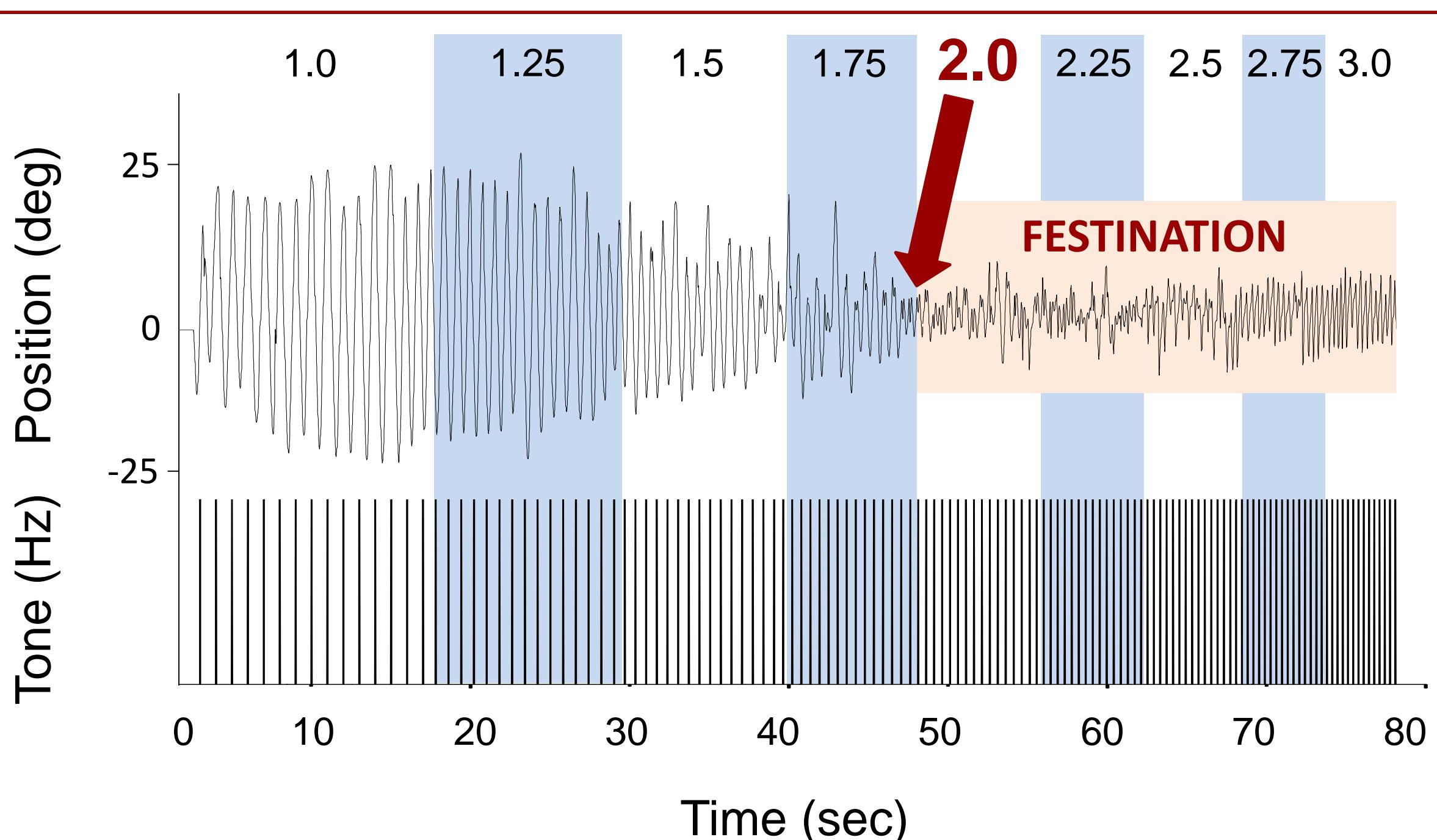


Figure 1. An example of festination at rates near to and above 2 Hz in a person with PD. **Movement festination is a change in movement rate and movement amplitude accompanied by frequent hesitations in movement.**

PURPOSE

- To examine how performance of repetitive finger tapping changes as the disease progresses in persons with PD.
- Hypothesis:** Since PD is a progressive disease, we hypothesize that movement amplitude will decrease and movement rate difference will increase at follow-up.

METHODOLOGY

Participants:

- 20 Persons with PD were tested twice. Once at baseline and again at follow-up trial with at least 6 months between data collections.
- Participants with PD were tested on medication using their most affected hand.

Table 1. Participant Demographics (at baseline trial)

GROUP	PD
Number of Participants	20
Age (Mean)	67
Handedness (%R)	95%
Hand Tested (%R)	50%
Gender (%F)	65%
Disease Duration (Mean)	5.8

Data Collection:

- Participants completed an unconstrained finger flexion-extension movement in time with a series of acoustic tones presented at 1 Hz for 15 intervals, and then increased by 0.25 Hz every 15 intervals until reaching 3 Hz (Figure 1).
- The forearm, wrist, thumb, and fingers 2-4 were supported by a brace, and position was collected using a goniometer (Figure 2).

Outcome Measures:

- Normalized Peak to Peak Amplitude (finger movement)
- Movement Rate Difference (between tapping and tone frequency)

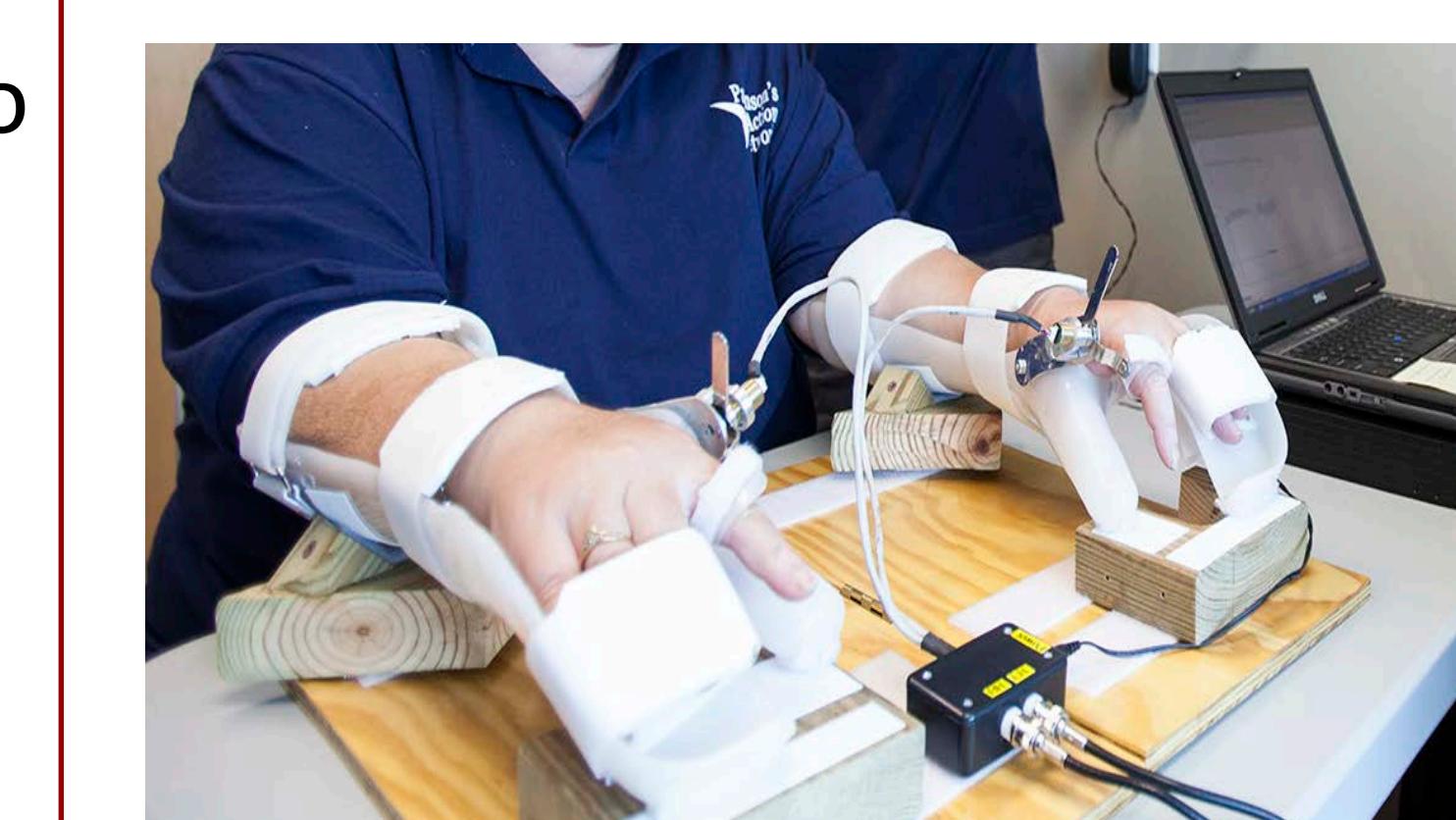


Figure 2. Data collection set up.

Statistical Analysis:

- A 2x9 Repeated Measures ANOVA was applied for each outcome measure. (Baseline vs. Follow-up, and 9 Tone Rates)

RESULTS

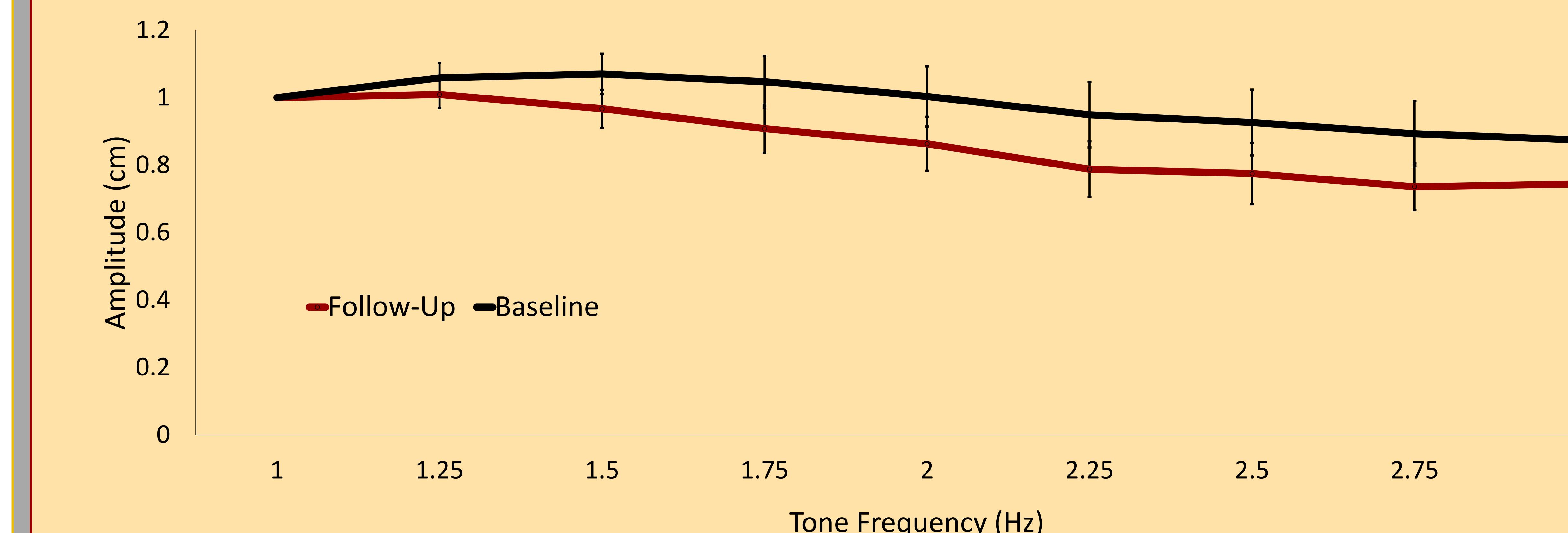


Figure 3: Normalized Amplitude across all tone rates baseline test to follow-up. Statistical analysis revealed a main effect of tone rate ($F(8) = 9.16, p < 0.001$). Normalized amplitude decreased by 13% in the follow-up trial. However, statistical analysis did not reveal a main effect of data collection time ($F(1) = 1.27, p = 0.267$) No interaction effect was revealed.

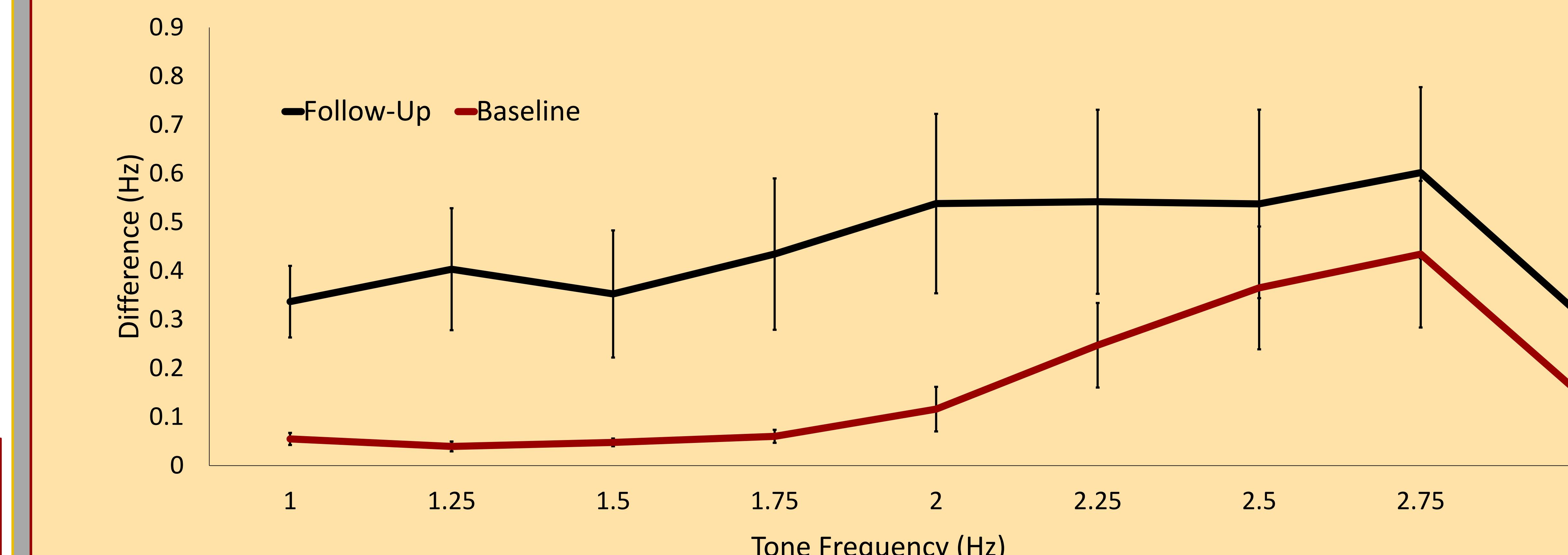


Figure 4: Movement Rate Difference across all tone rates from baseline to follow-up. Statistical analysis revealed a main effect of tone rate ($F(8) = 4.73, p < 0.001$). Movement rate difference increased by 169% in the follow-up trial. However, statistical analysis revealed a trend towards a main effect of data collection time ($F(1) = 3.90, p = 0.056$) No interaction effect was revealed.

DISCUSSION

- Results show that with progression of Parkinson's Disease, repetitive finger movement performance deteriorates. However, no significant differences were revealed.
- Sample Size of 20 participants could be increased in future studies.
- We will evaluate the contribution of time between baseline and follow-up data collections in future studies.
- Results from this study may help guide diagnosis and potential therapy techniques for persons with Parkinson's Disease.