

Levodopa is Necessary to Improve Gait and Balance in Parkinson's Patients after Deep Brain Stimulator Implantation

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Objective:

To determine which factor, either subthalamic nucleus (STN) or globus pallidus interna (GPi) deep brain stimulation (DBS) alone, or levodopa treatment has a greater impact in improving gait and balance for patients with Parkinson's disease (PD).

Background:

Both STN-DBS and GPi-DBS significantly improve motor functions for PD. However, actual gait, posture and balance improvements remain a challenge. Whether DBS or levodopa plays a more important role in gait performance for DBS patients needs further study.

Design/Methods:

Fifteen STN-DBS and sixteen GPi-DBS consecutive patients were recruited at our center. We analyzed the 5 items in UPDRS Part III related to gait (arising from chair, posture, gait, postural instability, bradykinesia), and 3 items of the stand-walk-sit test (seconds, steps, freezing episodes) at their 24th month visits. Each item during the states of “off-off” (medication on, stimulation off), “on-off”, and “on-on” were compared.

Fig. 1 Composite 5-Item UPDRS Scores in STN- and GPi-DBS

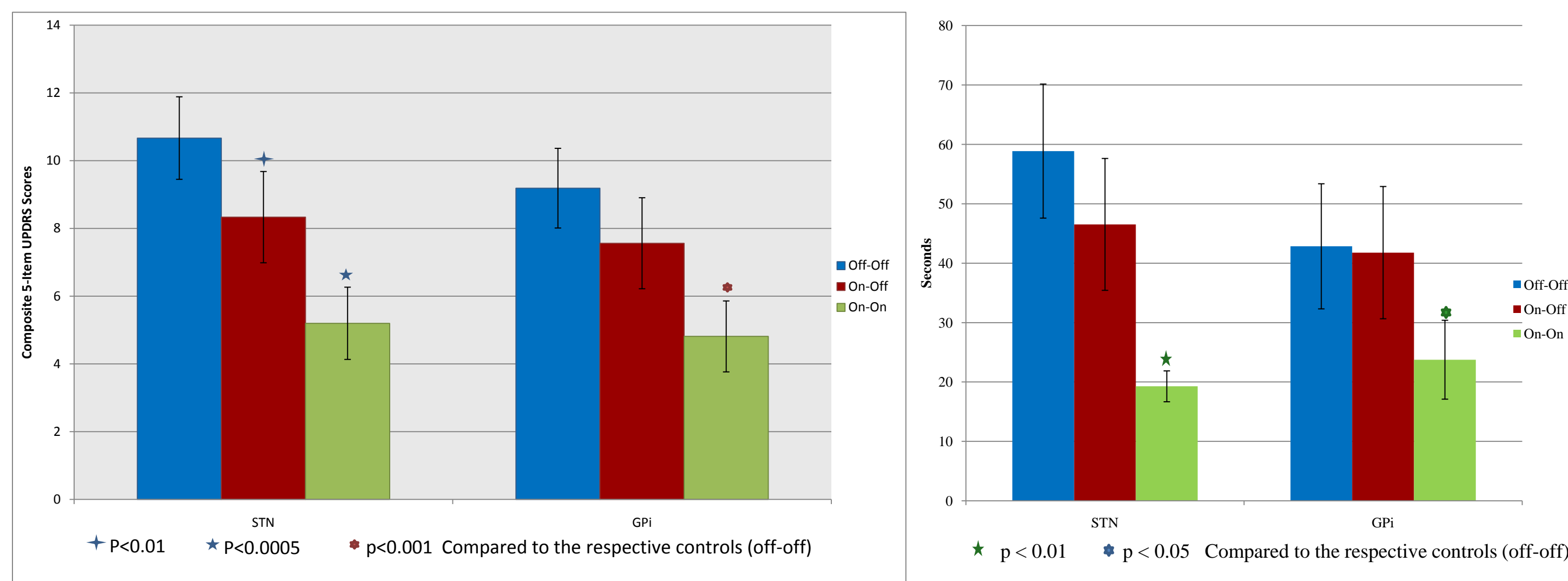


Fig. 2 Time (Seconds) Needed to Finish Stand-Walk-Sit Test

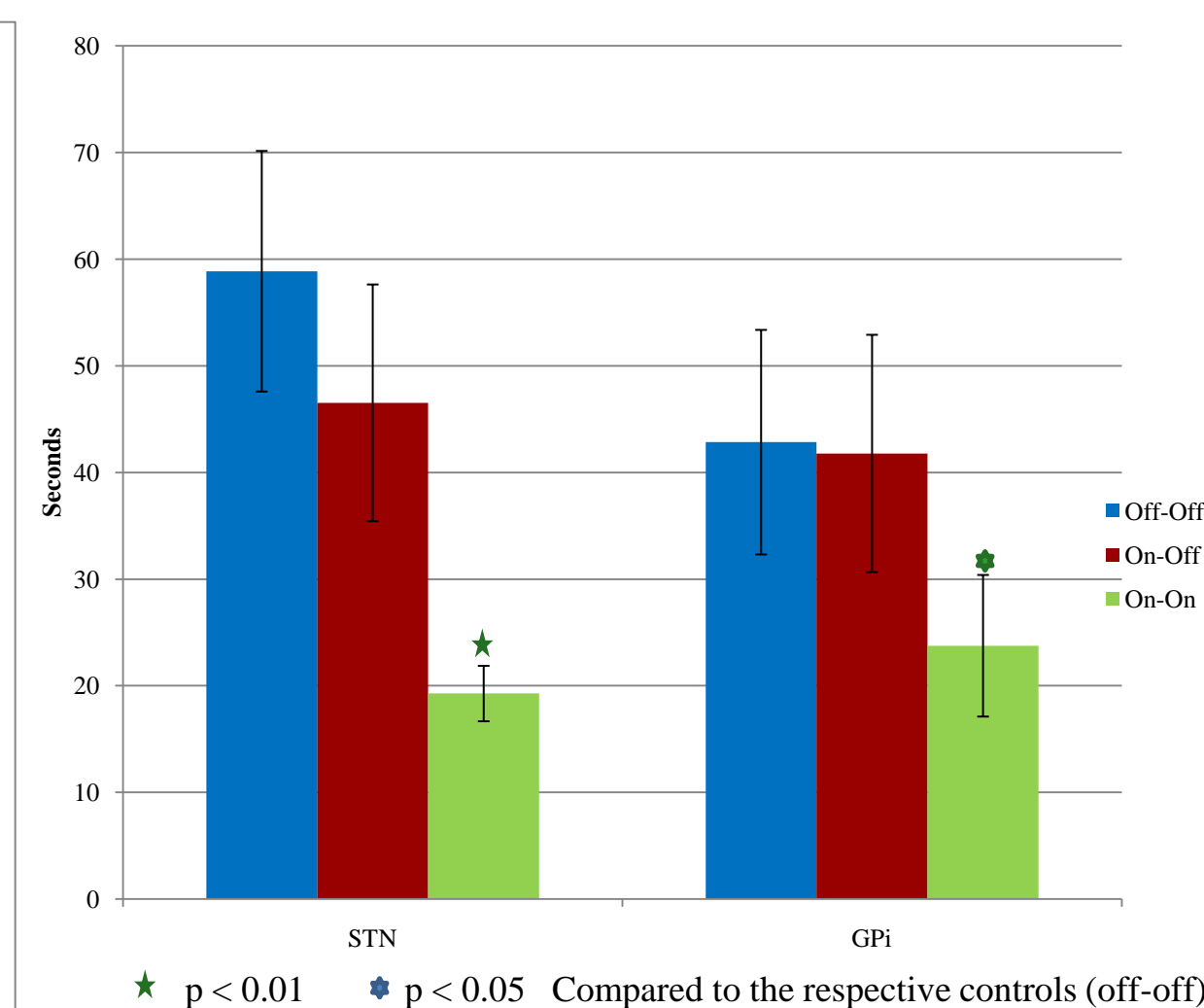


Fig. 3 Numbers of Steps Needed to Finish Stand-Walk-Sit Test

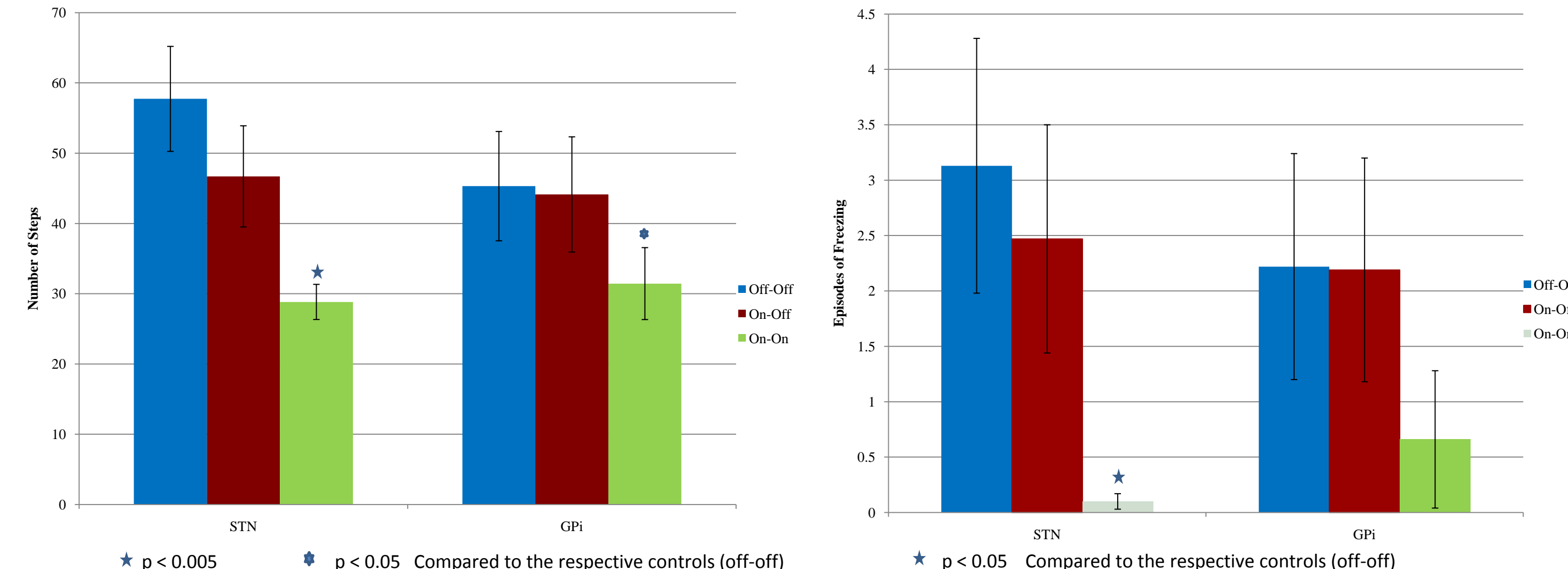
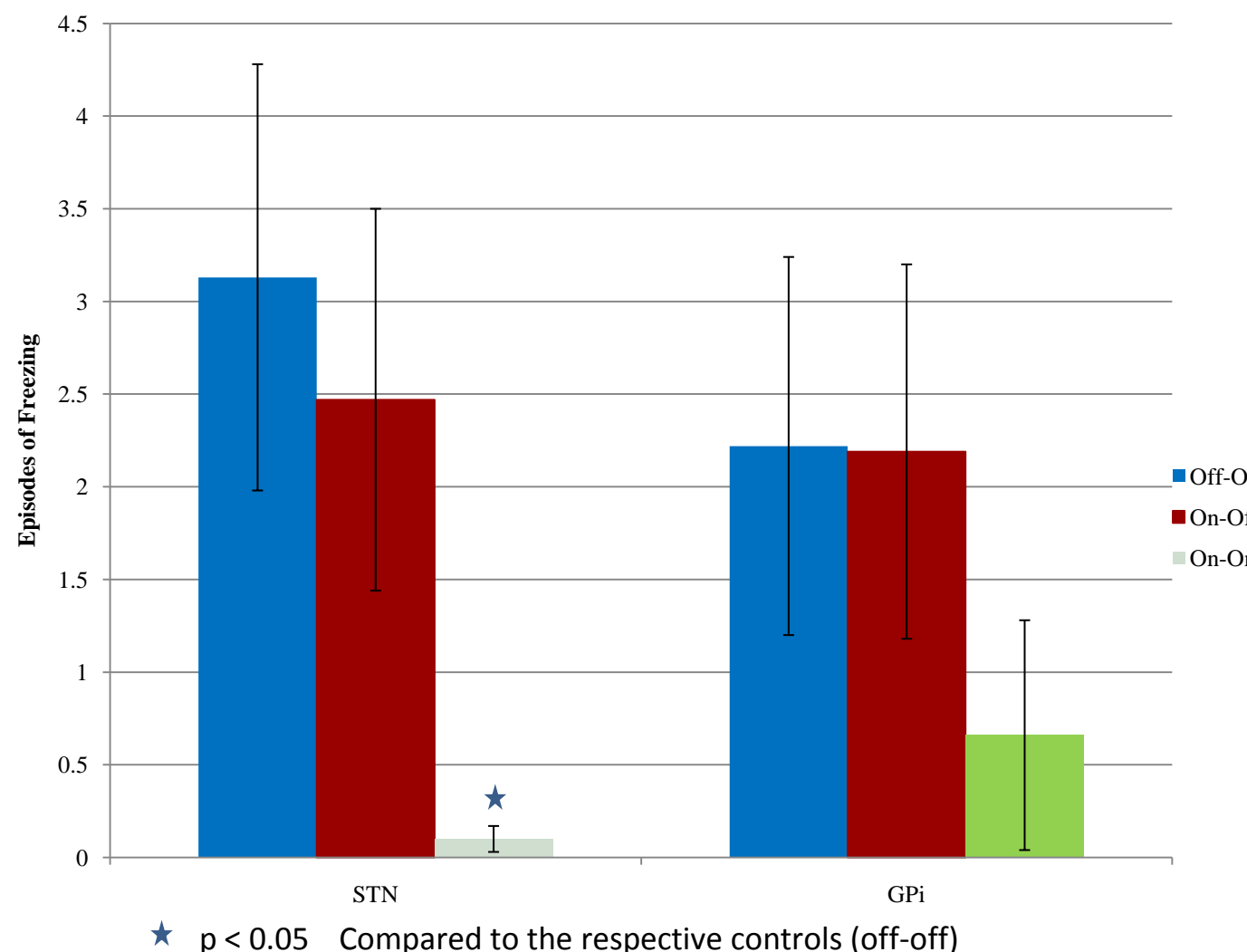


Fig. 4 Freezing Episodes Occurred During Stand-Walk-Sit Test



Results:

- When stimulators were "on" with medications off (on-off), the composite 5-item UPDRS III decreased by 2.33 (p>0.05) in STN-DBS; and decreased by 1.63 (p=0.002) in GPi-DBS when compared to “off-off”.
- The seconds, steps, freezing episodes of stand-walk-sit test during “on-off” reached 79.0%, 80.9%, 78.7% in STN-DBS; and 97.5%, 97.4%, 101.4% in GPi-DBS compared to “off-off” (lower is better).
- During “on-on”, the composite 5-item UPDRS were significantly improved when compared to “off-off”, and the sum decreased by 3.13 (p=0.0004) in STN-DBS; and 2.75 (p=0.0007) in GPi-DBS.
- During “on-on”, the items of stand-walk-sit test decreased to 41.4%, 61.7%, 4.1% in STN-DBS; and 56.8%, 71.2%, 29.6% in GPi-DBS, compared to “off-off”.

Conclusions:

- Our result suggests STN-DBS was slightly more effective than GPi-DBS.
- Adding levodopa substantially improved their UPDRS gait scores and stand-walk-sit test.
- Levodopa remains an effective adjunct treatment on gait and freezing for patients with PD even after DBS.