ISRCTN17784042 https://doi.org/10.1186/ISRCTN17784042

Can eye movement training restore saccades (quick eye movements) to normal in people with Parkinson's disease?

Submission date
30/05/2018

Recruitment status
No longer recruiting

Registration date
25/07/2018

Overall study status
Completed

Last Edited
12/06/2019

Condition category
Nervous System Diseases

[ ] Prospectively registered
[X] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
Eye movement has been shown to decline over time in healthy aging and even more in persons with Parkinson's disease. This study will measure the effects of eye movement training on persons with Parkinson's disease and healthy persons aged 40 and over. We believe that, compared to healthy participants, persons with Parkinson's disease will show greater increases in the speed and distance of their eye movements, and greater decreases the time needed to start a movement and the number of movements required to reach the target following the training.

Who can participate?
Healthy people and people with Parkinson's disease aged 40 years and above.

What does the study involve?
During the 1-month training period, participants will come in 2 days a week to train some of their eye movements for 30 minutes. These movements will be trained in different directions and distances using an eye tracker, which participants will wear on their heads, and a large computer monitor, which will display the targets needed for training. Before and after the month of training, participants will perform the eye movements during testing sessions. We will compare four aspects of their eye movements: the distance each movement covers, the speed of the movement, how much time passes between being told to move and the beginning of the movement, and how many movements are needed to reach the presented target. For these testing sessions, participants with Parkinson's disease will be asked to delay their morning dose of medication until after the session has ended, so that their eye movement qualities can be measured accurately.

What are the possible benefits and risks of participating?
The Eye Tracker system that is used for the assessments and training has two cameras on a head mount located directly below eye level. The eye movements are monitored by a device that captures infrared light reflected off the lens and cornea of the eyes. The lens, cornea, and other parts of the eye absorb a small amount of energy from infrared light, but the energy is less than

18% of the Maximum Permissible Exposure level as certified by the American Standards Institute (ANSI Z 136.1-1973).
As with any sort of movement training, there is a risk of injury. Such risks in eye movement training may involve eye strains, fatigue, and the low-risk possibility of orbital myositis (inflammation of the muscles that control eye movement). Even though eye strain is only temporary, we will be taking important precautionary measures to prevent any sort of discomfort. In order to prevent eye strains, fatigue, and orbital myositis, we will give clear instruction to participants that they can stop the training at any time with the earliest sign of discomfort; warm-up periods will be given to reduce the possibility of injury; and frequent naturally occurring breaks in the trial schedule will provide participants with rest time. Serious physical injury is considered unlikely given the screening process, physician approval, and oversight by researchers.
In addition, there is a slight risk to people with PD of delaying taking their PD medication until after the assessment. The OFF-state may introduce discomfort by increasing movement-related PD symptoms in participants. These symptoms can appear as movement problems, muscle tone problems, and/or freezing. The trial will only include participants with PD whose PD symptoms place them on the Hoehn & Yahr scale at grade 1 or 2. This means that the symptoms and disability are mild. The participants will delay taking only their medication relating to movement problems, and will remain on a regular schedule for all other medications.
Participants with PD will be instructed to consult with their neurologist to request medical approval for participation in the study. The physician clearance form will have an area to provide instructions for any required changes to the OFF-medication assessment timeline. This might include, but not limited to, changes in the participant's return to their medicated ON-state. The physician clearance form will include additional area for any special instructions to the research team and caregivers.
There is no risk of falling during eye-tracking related assessments because participants will be seated the entire time. However, the movement component of the MDS-UPDRS assessment includes tasks like walking that may introduce a risk of falling. This risk is managed by the presence of two or three research staff members on site during assessments, use of a gait belt to help researchers to support the participant when walking, the presence of ballet barres in the laboratory that can be used for physical support when walking, and the presence of the participants' caregivers.
In rare cases, going off medications may induce Parkinson's Hyperpyrexia Syndrome (PHS). If left untreated for 72-92 hours, PHS can lead to fever, and severe rigidity/tremor, and can be life threatening without emergency care. We will reduce the risk of PHS by excluding participants with advanced PD as well as by minimizing the time spent off medications. The protocol is designed to limit the time spent in the OFF-state to no more than 2 hours. While we do not expect an adverse event like PHS, the participant's neurologist will be contacted using the number provided in the physician's clearance form if there are symptoms that suggest PHS. In the case that the neurologist is unreachable, a 911 call will be placed.

The potential benefits of improved eye coordination, range of motion, and responsiveness to changes in what is seen outweigh the minimal risk for eye strain/injury.
It is common to assess participants in the OFF-state in PD research. This is so that we can investigate the disease without the influence of movement-targeted medications that mask the symptoms. This means that the study results are relevant to people with undiscovered and untreated PD and might lead to earlier detection of PD, making it more treatable.

Where is the study run from?
The Neuroscience of Dance in Health and Disability Laboratory at the University of Illinois at Urbana-Champaign

When is the study starting and how long is it expected to run for?
January 2015 to August 2020 (updated 12/06/2019, previously: August 2019)

Who is funding the study?
This study has no external funding.

Who is the main contact?
The main contact for this study is the Principal Investigator, Dr. Citlali Lopez-Ortiz, who can be contacted via email at lopezort@illinois.edu.

Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
16033

Study information

Scientific Title
Are voluntary saccades robust biomarkers to mass training in PD?

Study objectives
The outcome measures for comparisons before and after training consist of amplitude, latency, and duration of voluntary and reflexive saccades. We hypothesize that after training the outcome variables will be closer in value to those of healthy control participants. We also hypothesize that, compared to healthy participants, persons with Parkinson's disease will show greater increases in the speed and distance of their eye movements, and greater decreases in the time needed to start a movement and the number of movements required to reach the target following the training.

Ethics approval required
Old ethics approval format

Ethics approval(s)

University of Illinois at Urbana-Champaign Institutional Review Board, 15/01/2015, IRB #16033

Primary study design
Interventional

Study design
Non-randomised controlled trial

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Parkinson's disease

Interventions
We designed this study as a two-arm experiment with 22 participants with Parkinson's disease (PD) and 22 healthy controls. All participants will be aged 40 years and over, recruited from the local community through posted flyers, interactions with support groups, and local neurologists. Prior the beginning of training, each participant will be assessed for voluntary and reflexive saccade performance. Four measures will be blindly assessed using this data: the normalized amplitudes of saccades, saccadic velocity, latency between stimulus presentation and saccade initiation, and the number of saccades needed to reach the target amplitude. Participants will then perform 30 minutes of training twice a week for a total of 4 consecutive weeks. The training will consist only of voluntary saccade trials, with the participant performing 40 trials for each of three amplitudes, which will be set on each session according to an intercalated training schedule of progressive and regressing load design. For each amplitude, the participants will perform saccades to each of the eight cardinal and intercardinal directions. These movements will be trained in different directions and distances using an eye tracker, which participants will wear on their heads, and a large computer monitor, which will display the targets needed for training. Before and after the month of training, participants will perform the eye movements during testing sessions. We will compare four aspects of their eye movements: the distance each movement covers, the speed of the movement, how much time passes between being told to move and the beginning of the movement, and how many movements are needed to reach the presented target. During the week after the intervention period, each participant will be tested again following the same protocol as during the pre-intervention testing session. Participants with PD will also be assessed using the Unified Parkinson’s Disease Rating Scale at the pre- and post-intervention testing points. For testing sessions, participants with PD will be asked to delay their morning dose of medication until after the session has ended, in order to accurately test changes to saccade performance and clinical outcomes. Results from pre- and post-intervention training will be compared using an ANOVA of mixed effects.

Intervention Type
Behavioural

Primary outcome(s)
Change in saccade latency from baseline to after 4 weeks of training

Key secondary outcome(s)
1. Change in number of saccades from baseline to after 4 weeks of training
2. Change in saccade length from baseline to after 4 weeks of training
3. Change in saccade velocity from baseline to after 4 weeks of training

Completion date
01/08/2020

Eligibility

Key inclusion criteria
Patients with Parkinson's disease:
1. Medically stable with diagnosis of PD meeting the UK PD Society Brain Bank Criteria –
2. Modified Hoehn & Yahr stage 1-2 (with unilateral involvement only, unilateral and axial involvement, and bilateral involvement without impairment of balance) in the conventionally defined OFF medication state
3. Has medical clearance form from their physician for participation in the study
4. Onn a stable regimen of PD medication 30 days prior to the initiation of the study and until the completion of the study
5. Willing and able to provide informed consent
6. Aged 40 years and above and up
7. Able to have a caregiver/family member present for OFF-state assessment sessions

Control group:
No known neuromuscular disorders

Healthy volunteers allowed
No

Age group
Adult

Sex
All

Key exclusion criteria
1. Presence of dementia based on a Montreal Cognitive Assessment (MOCA) score <25
2. Diagnosis of comorbid neurological disorder, such as epilepsy
3. History of neurological injury, such as stroke
4. History of brain surgery, such as deep brain stimulation
5. Concurrent severe medical illness that in the opinion of the research team will preclude participation in the study (such illnesses may include, but are not limited to, severe or uncontrolled cardiovascular disease, hypertension, pulmonary disease, or diabetes)
6. Inability to attend and participate in at least seven of the training sessions
7. Uncorrected vision defects, history of retinal disease (e.g. macular degeneration), presence of optic neuropathy due to glaucoma or ischemic optic neuropathy, pseudoexfoliation syndrome, ocular surgery, ocular trauma, visually significant cataract, orbital myositis, blindness or refractive errors outside -5 to +3 D
8. Indication by the participant’s neurologist in the medical release form that testing the participant in the OFF-medication state would put PD participants at significant risk for medical complications

Date of first enrolment
16/02/2016

Date of final enrolment
30/05/2020

Locations

Countries of recruitment
United States of America

Study participating centre
University of Illinois at Urbana-Champaign
906 S Goodwin Avenue
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61801

Sponsor information

Organisation
University of Illinois at urbana-Champaign

ROR
https://ror.org/047426m28

Funder(s)

Funder type
Not defined

Funder Name
University of Illinois at Urbana-Champaign

Alternative Name(s)
Illinois, University of Illinois Urbana-Champaign, University of Illinois, University of Illinois, Urbana-Champaign, University of Illinois at Urbana Champaign, University of Illinois - Urbana-Champaign, University of Illinois at Urbana, U of I, Illinois Industrial University, UIUC

Funding Body Type
Government organisation

Funding Body Subtype
Universities (academic only)

Location
United States of America

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study will be stored in a publically available repository (Neuroscience Information Framework [https://neuinfo.org] or Illinois Data Bank [https://databank.illinois.edu]). The raw and processed data will be available as long as the data services allow. The data will be posted after the analysis is completed. Access will be available to anyone allowed to use the data services above according to the rues and regulations of each data service. All data will be deidentified and consent for posting the deidentified data will be included in the consent forms.

IPD sharing plan summary

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Protocol article	protocol	05/04/2019	29/04/2019	Yes	No