

Master track Medical Sensing and Stimulation

Accelerator Monitor app for arm swing analysis

Lieke Hermans, Sandra Horsten, Anniek Rozendaal, Jantine Schotman

Abstract

Objective and quantitative evaluation of the arm swing in PD patients could yield important diagnostic information but this is not common in the clinic right now. Therefore the goal of this research is to investigate whether a smartphone combined with an application like Accelerometer Monitor could be a useful tool for the monitoring of the arm swing. It then might be possible for patients to monitor their arm swing at home. First the application was compared to an accelerometer. Next the arm swing of four healthy subjects was measured with two different smartphones and finally the arm swing of two PD patients was measured. With the smartphone we were able to obtain realistic values but a multi-directional difference in the average of the maximum amplitude between the two smartphones was found. It is not yet clear whether the difference between the two smartphones was caused by the app or by the smartphone itself so this should have to be investigated.

Characteristics of saccades and nystagmus as an indicator for the severity of Parkinson's disease

Jasper van der Heijdt, Casper Huijsman, Nicole Rommens, Jord Vink

Abstract

Introduction

Parkinson's is a degenerative disorder of the central nervous system that results in movement-related symptoms, including the movement of the eyes.

Objective

This study aims to identify and quantify the characteristics of eye movement, i.e. saccades and optokinetic nystagmus, and whether they are affected in people with Parkinson's disease.

Methods

Saccade tests and optokinetic nystagmus tests were performed with a videonystagmograph (VNG) for three Parkinson's patients and four healthy subjects. A distinction was made between 'look' and 'stare' optokinetic nystagmus. Peak velocity and symmetry were observed. For the saccade tests, velocity, amplitude and latency were the parameters of interest.

Results

Only small differences were found in the measurements of the patient and control groups.

Conclusion

The small patient and control pool makes drawing conclusions difficult.

Abstract

Mattiënne van der Kamp, Laura Koot, David Roelofs, Pien Spoor

One of the major symptoms of Parkinson's disease is akinesia or bradykinesia. The clinical manifestations of akinesia are the slowness of movement and the decreased movement amplitude within a voluntary movement. Movement slowness is often present during the execution of single motor tasks and becomes more severe during complex and repetitive movements. Research showed that Parkinson patients find the finger tapping most difficult and the movement was the most impaired compared to other akinesia tests in early stages of the disease.

After fixating the wrist with a brace, accelerometers are fixed on the nails of the thumb and forefinger. Out of the acceleration data the frequency content and the amplitude is calculated and analyzed in order to find a quantitative measurement for the Parkinson's disease.

Abstract

Eliene Brand, Stefan Engelhard, Annemijn Jonkman en Ruud van Kaam

Introduction - Parkinson's disease (PD) is an illness with an increasing incidence in the Netherlands that is difficult to treat. These days, the subjective scoring of physicians is used for adjustments in therapy and medication. An accurate quantification of symptoms could lead to better treatment of these specific symptoms.

Method - In this study, the Riablo™ device is used to measure the scores of five PD patients while performing different movement exercises, to evaluate akinesia and postural disability. Several parameters, like knee angle, centre of pressure (COP) and the overall score were compared with the clinical history of the patient to investigate whether this data accurately represents the severity of the disease.

Results - The results of these measurements varied greatly, due to the large difference in symptom severity between patients.

Conclusion - It is concluded that the Riablo device is not suitable for initial diagnosis of PD symptoms, but could be of great value in monitoring the disease, if adjustments are made to the system.

Clinical applicability of handwriting test without direct feedback for objective diagnosis of Parkinson Disease

D. Groothuysen, I. Koopmans, P. Smits, M. Tijssen

ABSTRACT

Almost every symptom of Parkinson Disease can be tested. But most of these tests have to be interpreted by the neurologist and those subjective results can have big influence on the diagnosis and further treatment of the patient. Objective tests for patients who are seen by the doctor for the first time is desirable. Therefore we tested handwriting which can be objectively interpreted. Multiple parameters are selected and measured in the handwriting of PD patients and healthy subjects. Trying to make the analysis clinical applicable, the measurements are also done on an electronic tablet. This should make the measurement less labor-intensive but the handwriting is biased due to the lack of direct visual feedback and other difficulties with the tablet. The handwriting test is not ready for clinical implementation with an electronic tablet.

Feasibility of an objective measurement technology to measure bradykinesia and dysdiadochokinesis in patients diagnosed with Parkinson's disease

Niala den Braber, Thijs Hakkenberg, Erik Huizinga, Eline KleinJan

Parkinson's Disease (PD) patients often suffer from bradykinesia and fail to perform diadochokinesis tasks normally. The purpose of this study was to investigate the feasibility of an objective measurement technology to measure these symptoms in PD patients. A study was performed on six test subjects (three patients, three non-patients). A touch screen was used, on which the subjects performed three different tap trials for both the right and left hand independently. Results consist of tap location, amplitude, velocity and frequencies. The results are promising. However, more research is required to validate the potential of this diagnostic instrument. Additionally, it is desired to enhance the method to improve measurements.