

EXPLORATORY ANALYSIS ON THE EFFECT OF BILATERAL SUBTHALAMIC NUCLEUS DEEP BRAIN STIMULATION ON FATIGUE IN PARKINSON'S DISEASE

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Objective

To assess the effect of bilateral subthalamic nucleus (STN) deep brain stimulation (DBS) on fatigue using the Non Motor Symptoms Scale (NMSS) in Parkinson Disease's patients.

Background

Fatigue is a common and disabling non-motor symptom in Parkinson Disease's (PD) patients and can be evident from premotor to the palliative stages, with a clear impact on quality of life. The effect of subthalamic nucleus (STN) deep brain stimulation (DBS) on fatigue, however, currently remains unclear, although many patients selected for DBS also suffer from fatigue. As such comprehensive treatments for this NMS of PD represent an unmet need.

Methods

Cross-sectional analysis of 50 patients with idiopathic PD who underwent STN DBS at King's College and Salford Royal Hospital. The primary outcome measure was severity of fatigue (as measured by question 4 of the Non Motor Symptoms Scale (NMSS)).

Other outcome measures included the PD Sleep Scale (PDSS) and PD quality of life scale (PDQ8), Scales for Outcome in PD (SCOPA)-motor, Hoehn and Yahr (HY) stage and Levodopa Equivalent Daily Dose (LEDD).

Data were collected as part of the portfolio adopted global Non-motor International Longitudinal Study (NILS; UKCRN No: 10084), for which all patients gave written informed consent.

Results

For this analysis, 50 patients (20 females (40%) and 30 males (60%)) were included. Average age was 61.09±8.7 years, disease duration at baseline was 11.21±5.01 years and at last follow-up 13.72±5.25 years with a mean follow-up of 1.98±1.36 years (min. 0.37, max. 5.00 years). We observed a significant improvement in fatigue, (5.20±4.53 to 3.04±3.72; p=0.001). In addition, we observed improvements in in NMS domain 2 score (sleep/fatigue; 18.64±10.53 to 9.90±9.74; p<0.001), question 5 (sleep maintenance and fragmentation; 7.56±4.34 to 2.96±4.16; p<0.001), NMSS total score (87.80±46.17 to 52.40±39.68; p<0.001), and SCOPA A, B and C scores and HY stage (p≤0.007), as also previously reported in the EuroInf studies. LEDD, on the other hand, was unchanged at follow-up (p=0.08).

	Baseline	Last follow-up	p
Age	61.01±8.7	63.1±10.1	-
Sex (M/F)	30/20	30/20	-
Disease duration	11.21±5.01	13.72±5.25	-
Hoehn and Yahr	2.9±0.9	2.3±1.0	0.007
LEDD	984±432.3	861±490.4	0.080
FATIGUE (NMS 4)	5.2±4.5	3.0±3.7	0.001
NMSS total	87.8±46.2	52.4±39.7	0.002
Domain 1	2.1±3.8	2.1±3.4	0.680
Domain 2	18.6±10.5	9.9±9.5	<0.001
Domain 3	10.0±13.3	6.2±9.1	0.19
Domain 4	1.0±3.0	1.9±3.7	0.63
Domain 5	5.7±7.0	5.2±7.2	0.06
Domain 6	7.3±8.0	4.9±5.8	0.36
Domain 7	10.3±10.3	12.0±11.2	0.25
Domain 8	3.6±5.8	2.5±4.9	0.25
Domain 9	16.1±10.9	9.7±11.2	0.001

Abbreviations: M: male; F: female; LEDD: Levodopa Equivalent Daily Dose; NMS: Non-motor symptom; NMSS: Non-motor symptoms scale

References

1. Kelvin L. Chou, Carol C. Persad, Parag G. Patil, Change in fatigue after bilateral subthalamic nucleus deep brain stimulation for Parkinson's disease. *Parkinsonism and Related Disorders* 18 (2012) 510-513.
2. Haidar Salimi Dafsari, Prashanth Reddy, Christiane Herchenbach, Stefanie Wawro, Jan Niklas Petry-Schmelzer, Veerle Visser-Vandewalle, Alexandra Rizos, Monty Silverdale, Keyoumars Ashkan, Michael Samuel, Julian Evans, Carlo A. Huber a, Gereon R. Fink a, Angelo Antonini e, K. Ray Chaudhuri, Pablo Martinez-Martin, Lars Timmermann, on behalf of the IPMDS Non-Motor Symptoms Study Group. Beneficial Effects of Bilateral Subthalamic Stimulation on Non-Motor Symptoms in Parkinson's Disease. *Brain Stimulation* 9 (2016) 78-85.
3. Haidar S. Dafsari, MD, Monty Silverdale, MD, PhD, Marian Strack, Alexandra Rizos, MSc, Keyoumars Ashkan, MD, PhD, Picabo Mahlstedt, Lena Sachse, Julia Steffen, MD, Till A. Dembek, MD, Veerle Visser-Vandewalle, MD, PhD, Julian Evans, MD, PhD, Angelo Antonini, MD, PhD, Pablo Martinez-Martin, MD, PhD, K. Ray-Chaudhuri, MD, PhD and Lars Timmermann, MD, on behalf of EUROPAR and the IPMDS Non Motor PD. Nonmotor Symptoms Evolution During 24 Months of Bilateral Subthalamic Stimulation in Parkinson's Disease. *Movement Disorders*, Vol. 00, No. 00, 2017.
4. Abhijit Chaudhuri, Peter O. Behan. Fatigue and basal ganglia. *Journal of the Neurological Sciences* 179 (2000) 34-42.
5. G. Fabbri, A. Latorre, A. Suppa, M. Bloise, M. Frontoni, A. Berardelli. Fatigue in Parkinson's disease: Motor or non-motor symptom? *Parkinsonism and Related Disorders* 19 (2013) 148-152

Conclusions

Fatigue, a key NMS of PD, appears to improve significantly after STN DBS with persisting benefits at two years follow-up. Further controlled studies using fatigue specific scales are required.