

Urinary symptom-related quality of life is associated with health-related quality of life in patients with Parkinson's disease who undergo deep brain stimulation.

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Hypothesis / aims of study

- Parkinson's disease (PD) is a neurodegenerative disorder characterized clinically by bradykinesia, rigidity, and resting tremor.
- It is also well-known that non-motor symptoms, including lower urinary tract symptoms (LUTS), are prevalent and severe in PD patients.
- Deep brain stimulation (DBS) is performed for advanced stages of PD in patients presenting severe motor complications. Although it is well-known that DBS dramatically improves motor complications, its effects on LUTS remain to be elucidated. Furthermore, recent studies usually examine the effect of DBS by changes in quality of life (QOL) scores. However, we do not know to what extent LUTS affect QOL in PD patients.
- We aim to clarify the association between LUTS-related QOL and health-related QOL in PD patients who undergo DBS.

Study design, materials and methods

- We retrospectively reviewed the scores of the Overactive Bladder Symptom Scale (OABSS), International Prostate Symptom Score (IPSS), and IPSS-QOL in Parkinson's disease (PD) patients who underwent subthalamic nucleus (STN)-deep brain stimulation (DBS). Health-related quality of life (QOL) was evaluated using the Parkinson's Disease Questionnaire (PDQ)-39.
- The evaluations were conducted before and after surgery (at three months and one-year post-surgery). Correlation coefficients between lower urinary tract symptoms (LUTS) (OABSS and IPSS scores), IPSS-QOL, and the PDQ-39 score were calculated.
- As PDQ-39 comprises eight subcategories such as mobility, activities of daily living (ADL), emotional well-being, stigma, social support, cognition, communication, and bodily discomfort, we assessed the correlational coefficients between the subcategories of PDQ-39 and LUTS/IPSS-QOL.
- Additionally, we performed multivariable regression analysis to determine which subcategories of PDQ-39 contributed to IPSS-QOL.

Results

We examined 43 PD patients (mean age 63.7±0.8 years, mean disease duration 11.8±0.4 years) preoperatively. Post-operative evaluations were conducted in 24 PD patients three months and one year after surgery.

	pre	3 months	p value	Cohen's d
OABSS	4.70±0.43	4.12±0.52	0.393	0.18
IPSS	6.81±0.81	6.31±1.13	0.602	0.11
IPSS-QOL	3.32±0.23	2.70±0.38	0.05	0.34
PDQ-39 SI	36.0±2.0%	27.0±2.0%	<0.01	0.46

	pre	1 year	p value	Cohen's d
OABSS	4.70±0.43	3.93±0.54	0.011	0.56
IPSS	6.81±0.81	5.32±0.85	0.37	0.18
IPSS-QOL	3.32±0.23	2.43±0.24	0.05	0.334
PDQ-39 SI	36.0±2.0%	25.0±2.0%	<0.01	0.31

- OABSS significantly decreased one year after surgery (4.70→3.93, p=0.011, Cohen's d=0.56).
- Although the score of IPSS tended to decrease after surgery without statistical significance (three months after surgery 6.81±0.81→6.31±1.13, p=0.602; one year after surgery 6.81±0.81→5.32±0.85, p=0.378), IPSS-QOL score significantly decreased three months after surgery (3.32±0.23→2.70±0.38, p=0.05, Cohen's d=0.419) and one year after surgery (3.32±0.23→2.43±0.24, p=0.05, Cohen's d=0.339).
- PDQ-39 summary index significantly improved three months (36.0±2.0% to 27.0±2.0%, p<0.01, Cohen's d=0.46) and one year after surgery (36.0±2.0% to 25.0±2.0%, p=0.05, Cohen's d=0.31).

		mobility	ADL	emotional well being	stigma	social support	cognition	communi- cation	bodily discomfort
OABSS pre	r	0.205	0.104	0.142	0.125	0.153	0.024	0.084	-0.168
	p	0.163	0.481	0.341	0.396	0.301	0.873	0.571	0.254
IPSS pre	r	0.045	0.234	0.022	-0.010	0.039	0.094	0.134	-0.137
	p	0.760	0.109	0.884	0.946	0.793	0.526	0.365	0.354
IPSS QOL pre	r	0.355*	0.466**	0.114	0.395**	0.440**	0.079	0.231	-0.021
	p	0.020	0.002	0.473	0.009	0.003	0.616	0.136	0.894
OABSS 3 months	r	0.540**	0.531**	0.543**	0.309	0.291	0.625**	0.400	0.211
	p	0.006	0.008	0.006	0.141	0.168	0.001	0.053	0.323
IPSS QOL 3 months	r	0.474*	0.365	0.485*	0.450*	0.496*	0.480*	0.404	0.413*
	p	0.019	0.080	0.016	0.027	0.014	0.018	0.050	0.045
IPSS 3 months	r	0.480*	0.459*	0.395	0.282	0.379	0.477*	0.333	0.389
	p	0.018	0.024	0.056	0.182	0.067	0.018	0.112	0.060
OABSS 1 year	r	-0.239	0.043	0.037	-0.133	0.061	0.139	0.237	0.085
	p	0.260	0.842	0.864	0.536	0.776	0.519	0.265	0.695
IPSS QOL 1 year	r	0.189	0.010	0.190	-0.084	0.096	0.291	-0.012	-0.029
	p	0.376	0.962	0.373	0.698	0.657	0.168	0.956	0.893
IPSS 1 year	r	-0.181	0.162	0.146	-0.123	-0.021	0.261	0.329	-0.171
	p	0.398	0.449	0.496	0.566	0.921	0.219	0.116	0.424

Pre-operative IPSS-QOL score and post-operative OABSS, IPSS, and IPSS-QOL score three months after surgery had significant positive correlational relationships with multiple subcategories of PDQ-39.

IPSS QOL	pre		3 months		1 year	
	standardized beta	p value	standardized beta	p value	standardized beta	p value
mobility	0.168	0.413	0.372	0.259	0.046	0.880
ADL	0.310	0.102	-0.238	0.556	-0.101	0.778
emotional well being	-0.438	0.031	0.187	0.617	0.306	0.431
stigma	0.100	0.574	0.005	0.989	-0.371	0.368
social support	0.559	0.003	0.320	0.377	0.301	0.454
cognition	-0.325	0.069	0.135	0.736	0.529	0.092
communicatio	0.209	0.353	-0.196	0.671	-0.388	0.406
bodily discomfort	0.062	0.707	0.296	0.265	-0.049	0.864

Regarding the associations between IPSS-QOL, and PDQ-39 subcategory, pre-operative PDQ-39 subcategory of social support (standardized beta =0.559, p=0.003) had significant positive associations (suggesting that increased social support contribute to the worsening of LUTS related QOL) with IPSS-QOL.

Interpretation of the results

- This study revealed that STN-DBS significantly improved LUTS and IPSS-QOL, as well as health-related QOL as evaluated by the PDQ-39.
- It has been reported that STN-DBS increased maximum bladder capacity and inhibited detrusor overactivity, which might contribute to the improvement of OABSS [1]. It should be noted that both the score of IPSS-QOL and PDQ-39 decreased significantly postoperatively in this study.
- Multivariable regression analysis suggested that IPSS-QOL had significant positive associations with the PDQ-39 subcategory of social support preoperatively. In PDQ-39, the sub-score of social support increases when PD patients feel that they have problems with their close personal relationships or lack support from their partner or family. In terms of health-related QOL, preoperative PD patients usually have severe motor complications and often require a lot of social support with toileting activities, leading to a higher score of IPSS-QOL.

Conclusions

STN-DBS significantly improved LUTS, IPSS-QOL, and health-related QOL in advanced stage PD patients. IPSS-QOL and health-related QOL are significantly associated in PD patients.

References

1. Jörg E, Sartori AM, Hofer AS, Baumann CR, Kessler TM. Deep brain stimulation effects on lower urinary tract function: Systematic review and meta-analysis. *Parkinsonism Relat Disord.* 2020 Oct;79:65-72. doi: 10.1016/j.parkreldis.2020.08.032. Epub 2020 Aug 26. PMID: 32889502.