

## **IMPACT OF BRAIN STIMULATION DEEP ON QUALITY OF LIFE AND MOOD IN PATIENTS WITH PARKINSON'S DISEASE**

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**Abstract:** Parkinson's disease (PD) is a neurodegenerative disease resulting from a reduction in dopamine production. Its treatment is basically by pharmacological measures. However, we are advanced stages of the disease, especially due to fluctuations in the engine, pharmacological treatment alone is not completely successful. Thus, the possibility of benefits to the patient by the technique of deep brain stimulation (DBS) arises. The aim of this study was to analyze the impact of pallidal or subthalamic DBS on these patients' quality of life (QoL). For that, two scales were used, comparing the pre- and postoperative results: the Beck Depression Inventory - BDI (evaluates the emotional aspect of the patients) and the PDQ-39 (evaluates the motor aspects and the social relationships). We can observe that the BDI assessment pointed to an average improvement of 9.5% and the PDQ-39 scores improved by 10.28%. There is evidence that patients submitted to the subthalamic or palliative DBS technique showed a significant QoL improvement, thus, DBS appears as an adjuvant in the fight against Parkinson's disease.

**Keywords:** Deep brain stimulation, Parkinson's disease, Depression, Quality of life.

## INTRODUCTION

The illness in Parkinson's (DP) have incidence at dust- population over 65 years of 1 to 2% worldwide and estimated prevalence in Brazil of 3.3%, making it a growing problem in the country due to the epi- demiology that we are going through <sup>1</sup>. This disease has devastating effects on its carriers, mainly if identified late, in the psychosocial scope. Furthermore, the association tion of PD with dementia and depression is frequent, with several studies demonstrating strong relationship in between they. There are studies that suggest that up to 80% of patients who

present DP they can to progress with frame in insanity associate <sup>2</sup>. The commitment motor often is associated with depression, due to the stigma placed on you patients and the own perception.

The treatment of PD is based on interventions pharmacological treatments, in addition to adjuvant therapies such as physical therapy sink and speech therapy. Among the drugs used, the levodopa It's The main, because to restore the levels in dopamine in the striatal region, the main reason for the appearance of motor symptoms. Over time the symptoms tend to progress due to the degenerative process on the substantia nigra. As symptoms worsen, there are need in increase at doses in levodopa and add other drugs to the treatment, such as do- agonists paminergics, inhibitors of dopamine metabolism (enzyme inhibitors) and amantadine (an of glutamatergic receptors). In the more advanced stages of PD, when there are motor fluctuations resulting from levodopa therapy, the optimal combination of drugs antiparkinsonian drugs is often not enough te to improve the patient's quality of life<sup>3</sup>. In that time, there is the possibility of patient benefit from with the surgical treatment of Parkinson's disease. In mid of the 20th century, ablative surgeries were performed with sions in structures such as the thalamus and internal globus pallidus. Later, from the 1990s onwards, the technique for deep brain stimulation with better effectiveness in the improvement of parkinsonian symptoms and less adverse. The mechanism of DBS in the subthalamic nucleus (NST) occurs by inhibiting hyperexcitability of the indirect pathway in PD, and in the internal globus pallidus (GPi) it acts in the modulation of the direct circuit path nigrostriatal <sup>4</sup>.

The stimulation cerebral deep emerged like a quite in to improve the symptoms engines and levodopa-induced dyskinesia in patients

with DP. Efficacy in motor symptoms and quality of life after surgery has been well documented in patients with DP.

The aim of this study was to evaluate the impact of deep brain stimulation on quality of life and humor in patients with DP.

## METHODS

The study was carried out in March 2015 to March 2016, in the Mood Disorders sector development of the Hospital of "Universidade Federal de São Paulo". And the project was submitted and approved by the Committee of Ethics in Search of that institution.

The criteria in inclusion From patients they were: to have the diagnosis in illness in Parkinson's idiopathic mon- UK brain bank criteria, have a consistent motor response to levodopa, and present motor complications (fluctuations and/or dyskinesias) currents of levodopa therapy not adequately controlled, age minimum in 18 years old, to accept to participate of the search (through signature of term in consent), to have capacity in to read and understand, and verbalization suitable to participate in the interview.

Data were collected by the main researcher. pal and by a neurologist specializing in mood disorder development during an individual interview, carried out in a private environment. Two tests were used, which will be explained later. The assessment of patients who had implanted the device was done after suspension (12 hours without use) of the drug levodopa (if the patient aware was in use), in order to assess motor activity. log exclusively due to the stimulation device brain.

To assess whether the technique used really had positive results on the patients, evaluations were made pre- and post-operative lessons for those submitted to surgery, through the platforms PDQ-39 and Inventory of Depression in Beck, being what first evaluate main- aspects related to

motricity and social relations elements, while the second, the humor aspect. It was really a preoperative evaluation was carried out, and another postoperative one with follow-up six months after DBS. All you patients were informed about the research and signed a term of consent, agreeing with all its aspects.

For evaluation of humor were applied thr Inventory Beck Depression Inventory (BDI): Beck Depression Inventory Beck is the most comprehensive self-report measure of depression. widely used both in research and clinically, having been translated into several languages and validated in different tes countries. The scale original It consists in 21 items, including symptoms and attitudes, whose intensity varies from 0 to 3 and has a maximum score of 63. According to the criterion of *Center for Cognitive Therapy* cutoff points, they are Classified like: smaller what 10 = without depression or minimal depression; 10 to 18 = depression from mild to moderate; from 19 to 29 = moderate to severe depression and from 30 to 63 = severe depression. However, it is noteworthy that the spots in cut depend of characteristics from patients<sup>5</sup>.

Quality of life was assessed using the PDQ-39. The PDQ-39 platform seeks to evaluate the patient under different domains that influence their quality of life. Are they: mobility (10 questions), activities in life daily (6 questions), emotional well-being (6 questions), stigma (4 questions), social support (3 questions), cognition (4 questions). tions), communication (3 questions) and body discomfort (3 questions). Are 39 questions, related the frequency with what the patient had difficulty for accomplish some activate data during the previous month, what encompasses ("never"), 1 ("rarely"), 2 ("sometimes"), 3 ("often") and 4 ("always") points. The score for each domain is the sum from scores for each question divided for the

multiplication of 4 (maximum score for each question) by the number total in questions in each domain. This one result, per your time, is multiplied by 100. The value for each domain varies between 0 and 100, where zero means better quality. Ity in life and one hundred, worst quality of life <sup>6,7</sup>.

## RESULTS

Eleven patients were analyzed, of which 9 (81.8%) of sex masculine. The follow-up after 6 months of the surgery.

Patient	Sex	Age	Education	IDB	PDQ-39
1	M	34	5	17	41.63
2	M	61	4	15	51.63
3	M	61	16	14	51.88
4	M	53	0	11	53.13
5	M	56	7	6	22.38
6	F	37	8	10	58.40
7	M	52	2	17	69.30
8	F	47	9	14	59.00
9	M	51	11	25	74.63
10	F	65	2	41	78.50
11	M	68	4	13	61.50
<b>Total (average)</b>	-	<b>54</b>	<b>6</b>	<b>16.6</b>	<b>56.54</b>

Subtitle: IDB – Inventory Depression Beck;  
PDQ-39 – Quiz Quality in Life of the illness  
in Parkinson's; M – Male; F – Feminine.

Table 1. scores IDB and PDQ-39 From patients preoperative

was performed in 6 patients (Table 1). In the pre evaluation of depression by BDI, one patient had score less than or equal to 9, eight patients had score in between 10 The 18, a patient presented score in between 19 to 29, and one patient had a score of 30 to 63. mean score was 16.6, indicating depression Light, and one average in 14.3 spots at the pre operative for you six patients who reassessed after 6 months. The evaluation post-surgery, for the six patients who underwent the procedure. ment, the results were: three had a score of 9 or less, no depression (one had a decrease) tion of the score from 17 to 5; one had a decrease in score from 11 to 4; one had a decrease in his score of 6 to 4 and three had a score of 10 to 18, depression mild (one had a score decrease from 15 to 11; and two there was a slight increase in their score of 14 to 15, and from 10 to 11). The average after 6 months of post surgery presented a score of 8.3 compatible with improvement significant of the depression. (table two).

In assessing the quality of life with scalding of the PDQ-39, the preoperative evaluation presented the following following results:

Patient	Age	Target DBS	Education (years old)	IDB (1st application)	IDB (2nd application)	Variation IDB (Score and %)
1	34	left STN	5	17	5	-12 (-19, 0%)
2	61	STN bilateral	4	15	11	-4 (- 6.3%)
3	61	STN bilateral	16	14	15	+1 (+1.6%)
4	53	STN bilateral	0	11	4	-7 (-11.1%)
5	56	left STN	7	6	4	-2 (-3.2%)
6	37	GPi bilateral	8	10	11	+1 (+1.6%)
<b>Total (average)</b>	<b>50.3</b>	-	<b>6.6</b>	<b>14.3</b>	<b>8.3</b>	<b>-6.0 (-9.5%)</b>

Subtitle: IDB – Inventory Depression Beck.

Table two. scores and variation of IDB postoperative

smaller of what 33; seven patients presented score in between 33 and 67; three patients presented score larger of 67, calculating up the average in between all you patients, we have a score in 56.5 (regular quality in life) and a score in 46.50 (regular quality in life) for you six what they were reassessed after 6 months. At evaluation post-surgical, for the six patients, the results were: three had score smaller of what 33, Good quality in life (being what one had a decrease in his score, from 41.5 to 21.4; a had a decrease in its score, from 53.0 to 32.1; one had decrease in its score, from 22.3 to 17.7); and three learn sat score between 33 and 67, regular quality of life (being what two had decrease of your score, in 51.6 to 47.6 and from 58.3 to 36.6; and one had an increase in his score, from 51.9 to 61.3). Calculating the average, we have a score in 36.2 with regular quality in life, although, best of what at evaluation pre-surgical. (Table 3 and 4).

## DISCUSSION

During at latest decade, the DBS have signed-up like a treatment surgical safe and effective for a selected group of patients who have flu-motor impairments, dyskinesias and/or refractory tremor, from optimized drug therapy for PD. At the beginning of the 90s, with the work of Benabid and Pollak, high-frequency DBS surgery was introduced, resulting in new directions in the surgical treatment of PD<sup>8</sup> offering benefits, such as a marked reduction in symptoms parkinsonians and significant improvements in the quality of life. Studies clinical comparing the best target surgical in between GPi and STN, demonstrated what the presence in discinesia disabling and/or commitment cognitive light.

Patient	Target DBS	PDQ-39 – Mobility (Variation score and %)	PDQ-39 - Activity daily (Variation score and %)	PDQ-39 - Welfare emotional (Variation score and %)	PDQ-39 – Stigma (Variation score and %)
1	left STN	15 → 5 (-66.7%)	4 → 4 (0%)	54 → 8 (-85.2%)	31 → 0 (-100%)
2	STN bilateral	65 → 62.5 (-3.8%)	79 → 79 (0%)	42 → 29 (-30.9%)	25 → 44 (+76.0%)
3	STN bilateral	77.5 → 82.5 (+6.5%)	83 → 100 (+20.5%)	46 → 45.8 (-0.4%)	25 → 25 (0%)
4	STN bilateral	70 → 52.5 (-25%)	62.5 → 45.8 (-26.7%)	37.5 → 17 (-54.7%)	87.5 → 25 (-71.4%)
5	left STN	32.5 → 2.5 (- 92.3%)	29 → 0 (-100%)	17 → 16.7 (- 1.8%)	0 → 0 (0%)
6	GPi bilateral	97.5 → 32.5 (- 66.7%)	96 → 41.7 (- 56.6%)	67 → 83 (+ 23.9%)	87.5 → 19 (- 78.3%)
<b>Total (average)</b>	-	<b>59.58 → 39.58</b> (- 33.6%)	<b>58.92 → 45.08</b> (- 23.5%)	<b>43.92 → 33.25</b> (- 24.3%)	<b>42.67 → 18.83</b> (- 55.9%)

Subtitle: PDQ-39 – Quiz Quality in Life of the illness in Parkinson.

Table 3. scores and variations of PDQ-39, per domain, postoperative

Patient	PDQ-39 - Support Social (Variation score and %)	PDQ-39 - Cognition (Variation score and %)	PDQ-39 - Communication (Variation score and %)	PDQ-39 - pains at the body (Variation score and %)	PDQ-39 - Total (Variation score and %)
1	75 → 67 (- 10.7%)	37.5 → 12.5 (- 66.7%)	33 → 42 (+ 27.3%)	83 → 33 (- 60.2%)	41.56 → 21.44 (- 48.4%)
2	83 → 67 (- 19.3%)	69 → 50 (- 27.5%)	25 → 25 (0%)	25 → 25 (0%)	51.63 → 47.69 (- 7.6%)
3	67 → 67 (0%)	25 → 37.5 (+ 50.0%)	42 → 83.3 (+ 98.3%)	50 → 50 (0%)	51.94 → 61.39 (+ 18.2%)
4	67 → 67 (0%)	25 → 0 (-100%)	33 → 17 (- 48.5%)	42 → 33 (- 21.4%)	53.06 → 32.16 (- 39.4%)
5	67 → 58 (- 13.4%)	0 → 6.25 (-%)	0 → 0 (0%)	33 → 58 (+ 75.8%)	22.31 → 17.72 (- 20.6%)
6	33 → 33 (0%)	19 → 25 (+ 31.6%)	42 → 17 (- 59.5%)	25 → 42 (+ 68.0%)	58.38 → 36.65 (- 37.2%)
<b>Total (average)</b>	<b>65.33 → 59.83 (- 8.4%)</b>	<b>29.25 → 21.88 (- 25.2%)</b>	<b>29.17 → 30.72 (+ 5.3%)</b>	<b>43.00 → 40.22 (- 6.5%)</b>	<b>46.50 → 36.22 (- 22.1%)</b>

Subtitle: PDQ-39 – Quiz Quality in Life of the illness in Parkinson's

Table 4. scores and variations of the PDQ-39, by domain and in total, for the reassessed patients

with two or more domains affected, the GPI was the target of choice, as the STN showed worse cognitive performance, especially in verbal fluency, when compared to the GPI. However, patients undergoing implantation in the STN benefit from a greater reduction in the equivalent dose of levodopa in the postoperative period, when compared to GPI, improving dyskinesia indirectly, due to the reduction in the dose of levodopa<sup>9</sup>. Due to the presence of disabling dyskinesia, one of our patients underwent DBS surgery in GPI. A recent study with a 10-year follow-up after DBS surgery, showed significant improvement in a sample of 18 patients, analyzing motor scale items, such as tremor, bradykinesia and rigidity, reinforcing the benefit of surgery in the long term<sup>10</sup>. with follow-up until two years old after the surgery, lies in progress in our sector in disorders of movement.

## CONCLUSION

Therefore, after the analyze of these data, one can concluded that the technique of deep brain stimulation had a positive influence

on patients reassessed demonstrating improvement in the depressed mood and also had a positive influence on the func- motor skills, autonomy and quality of life of patients tes. New studies with larger sample and follow-up from patient and the long deadline will be necessary for to evaluate The improvement sustained at quality in life and symptoms not engines from DBS.

Our study included 6 patients with PD, analyzed preoperatively and 6 months after DBS surgery. Performance in quality of life and mood were assessed using the PDQ-39 and BDI questionnaires, respectively. The results showed a significant improvement in depressive mood and quality of life, evidenced by the reduction in the average score on the BDI and PDQ-39, 6 months after the surgery. The reasons for this effect are probably related to the reduction of parkinsonian symptoms and motor fluctuations provided by the surgery, and consequently better quality of life and mood in the postoperative period.

This analysis provides evidence that the improvement at quality in life and depression

after treatment with DBS was sustained after 6 months of surgery. In between- both had limitations, including the absence of a control group and relatively small sample size little. These results support a good long-term response. long term with the surgical treatment of PD, when associated with the

best medicinal therapy. The follow-up from symptoms engines and not engines of these patients

## **CONFLICTS IN INTEREST**

The authors declare not be conflicts.

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