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Review Article

AN ASSESSMENT OF THE EFFECTIVENESS OF THREE-MONTH MANAGEMENT OF IDIOPATHIC PARKINSON'S DISEASE (I-PD) WITH LEVODOPA (L-DOPA) TO TREAT FATIGUE SEVERITY, HRQOL AND CORTICAL DYSFUNCTIONS

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Abstract

Objectives: To explore the effect of levodopa against cortical functions, fatigue severity and health-related quality of life on patients with Parkinson's disease.

Methods: A clinical control trial was conducted at primary healthcare centers at Gia Lai province from September 2018 to November 2019. Fifty idiopathic Parkinsonian patients and fifty control individuals were enrolled. The measurements were cortical function assessment (CFA), fatigue severity scale (FSS), and 39-item Parkinson's disease questionnaire (PDQ-39). Descriptive analysis was used to perform the difference before and after treatment with L-Dopa.

Results: I-PD affected patients also had signs of cortical functioning deficits, severe fatigue experiences and deteriorated health-related quality than healthy individuals. The medication of L-Dopa significantly improved the life quality and reduced the fatigue severity in the timeframe of three months. Severe fatigue and deteriorated health also had an association with higher cortical functioning deficits. Cortical functioning also predicted about the fatigue severity and health-related quality.

Conclusion: The findings specifically suggest that L-Dopa treatment is very successful for cortical dysfunctions, severe fatigue and health-related quality of life among the patients of I-PD. Cortical functioning significantly indicates life quality and fatigue factor in the patients of I-PD.

Keywords: Cognition, Cortical, Chronic Fatigue, Health-Related Quality of Life, Levodopa, Parkinson.

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INTRODUCTION

Parkinson's Disease (PD) is a common neurodegenerative disorder which is likely to affect about nine million individuals until 2030 all over the world [1]. I-PD includes rigidity, kinesis and tremor as its characteristics as a result of various pathological mechanisms: increased [11C] (R)-PK11195 levels, cortical areas vulnerability and formation of subcortical greys from the dorsal motor nucleus in brain, motor systems and autonomic, continuous local neurotoxin presence till the time of death, corticocortical loss and deficiency of striatal dopamine that adds to cognitive deficiencies [2-5]. PD patients can be better treated with L-Dopa management. Vietnamese patients receive L-Dopa as monotherapy or combined with other agents such as anticholinergics and benserazide [6]. Recently research reported cognitive deficits in the Vietnamese population affected with PD. Other studies also reported better outcomes of L-Dopa on alertness, motor function, neuropsychological and cognitive performance on PD affected patients [2, 3].

The clinical role of L-Dopa on Parkinson's patients was identified, however, its role on their quality of life is limited. It is also worth indicating that most of the PD patients remain highly vulnerable to health-related quality of life (HRQoL) deterioration. Major aspects accounting for the perceived deterioration include non-motor symptom burdens and compromised motor ability [7, 8]. The latter trends point to the criticality of ensuring that in patients with PD, the HRQoL is assessed. Particularly, low HRQoL has been linked to different predictive forces. Some of these forces (motor symptom-related factors) include gait disorder, postural instability, motor complications, and disease severity [9, 10]. For predictive forces linked to non-motor symptom-related factors, examples of issues affecting PD patients' HRQoL include sleep problems, urinary disturbances, pain, fatigue, cognitive impairment, anxiety, and depression [11, 12]. Other studies have strived to unearth some of the independent determinants shaping HRQoL among PD patients. For such investigations, some of the independent features determining the patients' quality of life, which deviate from clinical aspects, include socio-demographic factors felt in the form of the affected populations' number of individuals in each household, as well as the level of education of patients and their families [11, 13]. In order to find out the missing links between the present and past literature, we conducted this research with an objective to determine the response of levodopa (L-Dopa) against cortical functions, fatigue severity and health-related quality of life on patients with Parkinson's disease.

METHODOLOGY

Study design and Study site

This is a clinical control trial conducted at primary healthcare centers at Gia Lai province, Vietnam from September 2018 to November 2019.

Study subjects and Sampling

During the study horizon, we included all patients that were eligible to the criteria. These patients were diagnosed with I-PD, aged 40 years old or older. Exclusion conditions included (1)

residual Parkinsonism owing to genetic illness or brain damage; (2) people without a confirmed diagnosis of PD; and (3) individuals who cannot finish the survey form for psychological reasons (e.g. disorientation) or language reasons (e.g., foreigners). A total of fifty patients were included. Moreover, fifty healthy control people were also enrolled of this particular research.

Study instrument

Every participant went through Fatigue Severity Scale, Parkinson's Disease Questionnaire and Cortical Function Assessment. We tested every patient for these tests before and after the treatment of L-Dopa. The patients were screened for dementia, depression, I-PD, stability on L-Dopa treatment, no intake of anti-depressants, dopamine agonist & anticholinergic drugs, psychiatric disorder history, neurological disorder history, CFA (Cortical Function Assessment), sensory extinction, naming, dictation, repetition, writing, stereognosis and drawing. The questionnaire of Parkinson's Disease assessed the HRQoL in eight different dimensions such as emotional well-being, daily living routine, social support, mobility, communication, stigma, bodily discomfort and cognition. We also measured the severity of fatigue with fatigue score indexing on seven scale formula. A trained psychologist tested the patients after ethical committee and individual approval. A healthy individual experienced single session; whereas, patients underwent two sessions before and after the treatment.

Data analysis

Data was entered into Microsoft Excel 2010 for management. Demographical characteristics of patients were presented as descriptive statistics. Clinical characteristics were presented as mean, standard deviation and 95% confidence intervals, which were computed by bootstrapping method with 1000 resamples.

RESULTS

Among 50 patients, the majority was male and at mild stage of the disease. About half of them had just suffer from Parkinson's for five years or lower (Table 1).

Table 1. Characteristics of patients with Parkinson's disease (N=50)

Characteristic	N(%)
Age	
Mean (SD)	64.6 (14.7)
Median (IQR)	65 (54-70)
Min-Max	46-90
Gender	
Male	35 (70.0)
Female	15 (30.0)
Stage of PD*	
Stage I	17 (34.0)
Stage II	11 (22.0)
Stage III	13 (26.0)
Stage IV and V	9 (18.0)
Disease history	
<3 years	23 (46.0)
3-5 years	21 (42.0)
≥5 years	6 (12.0)
Living area	
Rural	12 (24.0)
Urban	38 (76.0)
Occupation before retired	
White-collar worker	32 (64.0)
Blue-collar worker	11 (22.0)
Unemployed	7 (14.0)
Living with	
Partner	30 (60.0)
Alone	7 (14.0)
Progeny	13 (26.0)
Note: Data presented as n (%) unless stated otherwise; **Hoehn and Yahr stage (I= unilateral disease, II= bilateral disease without impairment of balance, III= bilateral disease with impaired postural reflexes, IV= severely disabling disease, and V= confined to bed or wheelchair unless aided). **Abbreviations:** IQR, interquartile range; PD, Parkinson's disease; SD, standard deviation	

As could be seen in Table 2 and Figure 1, L-Dopa posed a significant change in patients Parkinson's disease. The score total score of PDQ-39 and FSS decreased dramatically, while the total score of CFA increased accordingly. Although these indices did not reach the normal value of control group, this finding proved the role of L-Dopa in Parkinson's treatment.

Table 2. PDQ-39, CFA and FSS score of control group and patient group before versus after L-Dopa therapy

	Control (N=50)	**Before (N=50)**	**After (N=50)**
EMO	0.9 ± 0.4 (0.5 - 1.1)	22.7 ± 1.0 (22.1 - 23)	18.7 ± 1.1 (18.3 - 19.0)
ADL	0.7 ± 0.2 (0.5 - 0.9)	22.1 ± 0.8 (21.8 - 22.9)	18.8 ± 0.7 (18.2 - 19.0)
MOB	0.7 ± 0.6 (0.5 - 0.9)	37.3 ± 1.4 (36.7 - 38.1)	30.2 ± 1.2 (28.1 - 30.4)
SOC	1.1 ± 0.6 (0.6 - 1.4)	8.6 ± 1.1 (8.1 - 8.9)	3.2 ± 2.0 (2.9 - 3.7)
STI	0.8 ± 0.7 (0.4 - 1.3)	12.4 ± 2.1 (12.0 - 12.9)	4.3 ± 1.8 (3.8 - 4.8)
COM	1.0 ± 0.7 (0.6 - 1.4)	8.7 ± 2.0 (8.3 - 9.1)	3.4 ± 1.1 (3.0 - 3.8)
COG	0.8 ± 0.7 (0.4 - 1.3)	12.5 ± 2.1 (12 - 12.9)	4.5 ± 1.7 (4.0 - 5.0)
BOD	1.0 ± 0.6 (0.6 - 1.4)	8.6 ± 2.1 (8.2 - 9.0)	3.4 ± 1.2 (3.0 - 3.8)
PDQ-39	7.1 ± 2.6 (6.4 - 7.6)	130.5 ± 13.1 (130.2 - 137.7)	86.3 ± 8.7 (84.1 - 87.8)
CFA	9.9 ± 0.2 (9.5 - 9.8)	2.9 ± 0.55 (2.5 - 3.1)	6.5 ± 0.61 (6.2 - 6.7)
FSS	1.09 ± 0.43 (1.10 - 1.31)	5.96 ± 0.54 (5.7 - 6.5)	4.28 ± 0.73 (4.1 - 4.5)

Note: Data presented as mean ± standard deviation (95% confidence interval)

Abbreviation: EMO, emotional well-being; ADL, activities of daily living; MOB, mobility; SOC, social support; STI, stigma, COM, communication; COG, cognitions; BOD, bodily discomfort; CFA, Cortical function assessment; FSS, Fatigue severity scale; PD, Parkinson's disease; PDQ-39, 39-item Parkinson's disease questionnaire.

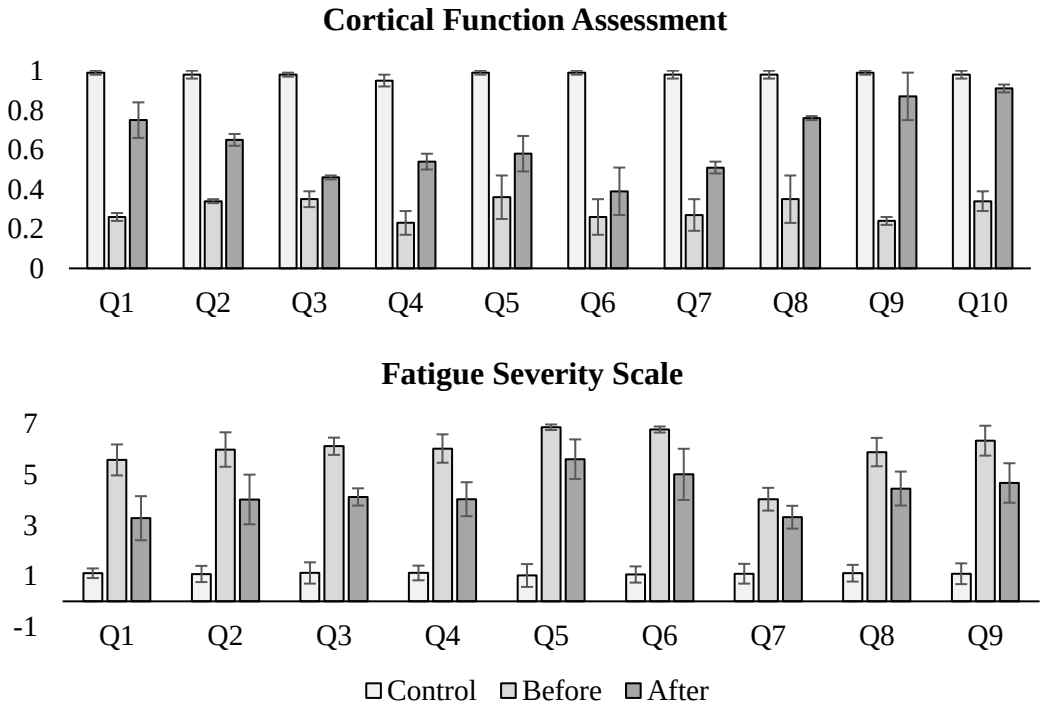

Figure 1. Average question scores of Cortical function assessment and Fatigue severity scale of control group and patient group before versus after L-Dopa therapy

DISCUSSION

The outcomes show that I-PD patients had deficits of cortical functioning, fatigue severity and deteriorated health-related quality of life than healthy individuals. As a result of three months, L-Dopa management cortical functions improved and HRQoL also improved among I-PD affected patients. Fatigue factor also reduced as a result of L-Dopa treatment. There was a negative correlation of cortical functioning with fatigue severity and HRQoL. The pathological features of L-Dopa also add to the cognitive deficits among PD affected patients.

Past studies also assessed the decline of the cognitive activity, HRQoL impact and reduced life quality due to declined cognitive health [14, 15]. Our correlation analysis highlighted higher deficits of cortical functioning with deteriorated HRQoL and severe

fatigue among I-PD affected patients. Fatigue was significantly presented by cortical functioning and HRQoL among I-PD patients. These outcomes are correlating with the previous outcomes about the deteriorated HRQoL with declined cognitive health of the patients. Whereas, in the present research literature no such relational effort exists about the assessment of HRQoL and severity of fatigue among I-PD patients.

Three months L-Dopa treatment is very much effective to reduce PD impairment; whereas, research studies do not assess the L-Dopa effectiveness on cortical functions. Positive changes are possible through L-Dopa in HRQoL and cortical functioning, fatigue and quality of life among I-PD patients. These outcomes are the same as previously reported outcomes about memory issues [16, 17]. These outcomes also pose a few implications in the field of rehabilitation and patient's care. We need to assess the cortical functioning at an initial stage of the I-PD management in order to prevent the chances of increased deterioration.

In healthcare, one of the key priorities entails patient safety. Most of the current health care providers have embraced systems responsible for monitoring and preventing harm, ensuring that quality improvements are steered by investing in various approaches [18]. Whereas these efforts are evident and seek to enable the organizations to keep abreast with patient needs and industry demands, especially regarding improvements in adverse event detection, one of the significant challenges involves the efficient resolution of problems related to patient safety. In the practice setting, which involves serving as an intensive care unit (ICU) nurse, one of the specific areas requiring quality improvement involves palliative care and supporting end-of-life.

Whereas this study's findings were insightful, it exhibited various limitations. For instance, clinical data collection occurred at a single point and in time, implying that PD's pattern progression and how it would shape the HRQoL of other cohorts was unlikely to be determined or predicted. In addition, the result from this study was relied on only some medical centers which lack of representative for national population.

CONCLUSION

The outcomes clearly conclude that treatment of L-Dopa is very much effective for cortical dysfunctions, severe fatigue and health-related quality of life among the patients of I-PD. Cortical functioning significantly indicates life quality and fatigue factor in the patients of I-PD.

CONFLICTS OF INTERESTS

The authors have no conflicts of interests to declare.

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