

The Relations Between Non-motor Symptoms and Motor Symptoms in Parkinson Disease

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The aim of this study was to evaluate the correlation between motor and non-motor symptoms in patients diagnosed with Parkinson. We included in our study 72 patients diagnosed with Parkinson disease: 28 female and 44 males. Each patient was evaluated using Non-motor Symptoms Questionnaire for Parkinson Disease, for motor status we used Unified Parkinson Disease Rating Scale (UPDRS) part 3 (motor part). The results of our study indicated that there is a correlation between the non-motor state and the motor symptoms but not in all non-motor domains. The study indicates that the digestive symptoms, the cardiovascular, sleep and miscellaneous correlate with the motor symptoms but urinary symptoms, memory, hallucination, depression and sexual dysfunction does not show an interdependence with the motor state.

Keywords: Parkinson disease, non-motor symptoms, motor symptoms

Parkinson disease (PD), one of the most common neurodegenerative disease, is classified as a movement disorder, but non-motor symptoms (NMS) also occur [1].

Traditionally, PD is characterized by its motor symptoms: bradykinesia, resting tremor and rigidity, but, in last decades, this concept has changed and now the disease is regarded as much a non-motor disorder as a motor disorder. Several studies showed that NMS are a real burden in PD which may appear even before the diagnosis of PD and that these NMS reflect a key determinant of the patient and career's quality of life [2].

Increasing data showed that PD is a multisystem disease rather than a disease and this is due to its multi-focal and multi-neurotransmitter driven pathology. The clinical phenotypic variations of PD are variable, and this is, in part, the consequence of a wide range of NMS which can include sleep dysfunction, psychiatric disorders, gastrointestinal dysfunction or autonomic dysfunction. But the change that underlie the NMS is still poor understand and they are not treated effectively well with dopamine-based drug therapy [3-5].

It is well known that motor symptoms affect quality of life in PD patients, but many reports have suggested that NMS can have a greater influence on the patient's life than

the motor symptoms. It is important to assess the presence of motor and non-motor symptoms and to evaluate the impact of these symptoms on quality of life [6-7].

The purpose of our study was to evaluate the distribution and correlations of the two types of symptoms.

Experimental part

Methods and Materials

We included in our study 72 patients (28 females and 44 males), mean age 67.56 ± 7.74 (range between 49 and 80 years, diagnosed with Parkinson Disease in according with United Kingdom Society Brain Bank criteria [8]). For each patient we recorded details of demographic data, age at onset, disease duration, symptoms at onset, medications, motor fluctuations and family history. The patients were assessed using United Parkinson Disease Rating Scale – motor section (UPDRS part III) [9]. This scale is an instrument with 27 items which assessed motor function related to tremor, rigidity, posture and bodily movement. Scores range from 0 to 108 points and higher scores indicate lower motor functioning.

The Hoehn and Yahr Scale was used for disease staging [10].

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Both scale (UPDRS and Hoehn and Yahr scale) were evaluated while the patients were in best *on* state.

To evaluate the non-motor symptoms, each patient was assessed by Non-motor Symptoms Questionnaire for Parkinson Disease (NMS Quest) [11]. It is a self-assessing tool that includes 30 questions covering 10 different domains ranging from gastrointestinal to miscellaneous. This questionnaire must be completed by the patient, checking the *no* or *yes* box. We rated 0 point if the patient's answer was *no* and 1 point if the patient's answer was *yes*.

For the memory impairment we used Mini-Mental State Examination (MMSE) test [12-13].

To evaluate sleep dysfunction the patients took the Parkinson Disease Sleep Scale (PDSS) [14].

The statistical analysis was made using IBM SPSS Statistics V20.

We performed both descriptive and exploratory data analysis. For comparisons we used one tailed student T-test and for correlation - Pearson R test, with the statistically significance established at 95%, $p < 0.05$.

Results and discussions

The present study evaluated PD patients that preformed our protocol from 2017 to 2019. There were included 34 from rural environment and 38 urban. When evaluated the disease progression there were included patients from stage 1 to stage 5 H&Y with an medium distribution around stage 3.

The aim of this study was to analyze the relation between the two types of symptomatology in PD, motor and non-motor.

In the figure 1 we can observe that there was a positive correlation between the motor and non-motor state of our patients. This means that as the motor symptomatology accentuate the non-motor one follows the same trend.

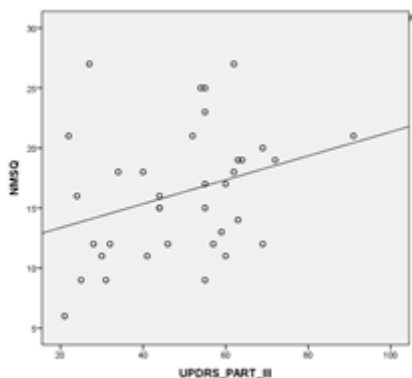


Fig.1. Correlation between NMSQ and UPDRS part III

In the table above we observe that there was an correlation with an statistical significance with $p = 0.008$ (table 1).

Given the literature data that not all non-motor features correlate with the motor ones, we went further to analyze the different domains of NMSQ to compare it with the motor state of our patients.

There was no surprise to realize that not all NMSQ domains correlated with the motor UPDRS.

In the table below we can observe an positive correlation when it comes to digestive, cardiovascular, sleep and miscellaneous domains. On the other side the urinary, memory, hallucination, depression and sexual function domain did not correlate. On the positive correlation we had an statistical significance established with $p < 0.05$ (table 2).

We went further and considered that for the memory and sleep we can better analyze it with the validated questionnaires for each one.

We observed that for the sleep dysfunction there was an negative correlation with the motor UPDRS, with p value of 0.03. This negative correlation can be explained by the fact that the PDSS questionnaire has an decrease of the score as the dysfunction accentuate and the UPDRS part III score increases as the motor symptoms progresses. This significate that there is an relation between the sleep and motor dysfunction (table 3, fig. 2).

When it comes to memory there was no correlation with the motor UPDRS. This shows that the memory domain evaluated with the NMSQ showed the same correlation status as the validated questionnaire for memory (MMSE), showing that MNSQ domains can proper evaluate the non-motor state (table 4, fig. 3).

Table 1
CORRELATION BETWEEN NMSQ AND UPDRS PART III
Correlations

		UPDRS_PART_III	NMSQ
UPDRS_PART_III	Pearson Correlation	1	.312
	Sig. (2-tailed)		.008
	N	72	72
NMSQ	Pearson Correlation	.312*	1
	Sig. (2-tailed)	.008	
	N	72	1048574

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2
CORRELATION BETWEEN NMSQ DOMAINS AND UPDRS PART III
Correlations

		Digestive_symptoms	Urinary	Memory	Hallucination	Depression	Sexual_function	Cardiovascular	Sleep	Miscellaneous
UPDRS_PART_III	Pearson Correlation	.361	.146	.139	-.174	-.094	-.029	.298	.264	.270
	Sig. (2-tailed)	.002	.220	.243	.143	.432	.811	.011	.025	.022
	N	72	72	72	72	72	72	72	72	72

Table 3
CORRELATION BETWEEN PDSS AND UPDRS PART III
Correlations

		UPDRS_PART_III	PDSS
UPDRS_PART_III	Pearson Correlation	1	-.249
	Sig. (2-tailed)		.035
	N	72	72
PDSS	Pearson Correlation	-.249	1
	Sig. (2-tailed)	.035	
	N	72	72

*. Correlation is significant at the 0.05 level (2-tailed).

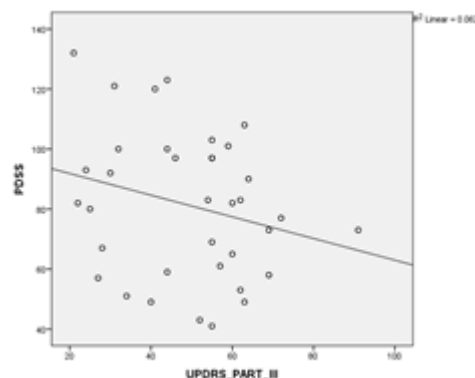


Fig.2. Correlation between PDSS and UPDRS part III

Table 4
CORRELATION BETWEEN MMSE AND UPDRS PART III

		Correlations	
		UPDRS_PAR T_III	MMSE
UPDRS_PART_III	Pearson Correlation	1	-.179
	Sig. (2-tailed)		.133
	N	72	72
MMSE	Pearson Correlation	-.179	1
	Sig. (2-tailed)	.133	
	N	72	72

This study shows that the incomplete discovery of the pathophysiology process of PD has an impact on those patients disease management. It is important that we treat both motor and non-motor symptoms to offer our patients the best quality of life possible in their stage of the disease.

As in our study, other findings showed that there is a correlation between the motor and non-motor symptoms[15-16].

When it comes to sleep the literature is mentioned that even if the patients report an improve of motor function when the sleep dysfunction diminuates, there is no objective improvement of the motor function [17-19]. In our study there was an correlation between those two[20].

The memory impairment is linked in other studies to the progression of the motor state but in this study there was no statistical correlation between those two[21].

This shows that both motor and non-motor symptoms affect the quality of life of PD patients and the case management should be made by an multidisciplinary team.

Conclusions

Patients with PD have an variety of symptoms that should be recognized and treated. In this study we headlighted that some of the non-motor symptoms correlate with the motor state of our patients, among them there are digestive, cardiovascular, sleep and miscellaneous domains. On the other side some of the symptoms does not present an interdependence with the motor symptoms as urinary, memory, hallucination, depression and sexual function domain, and it should be treated separately.

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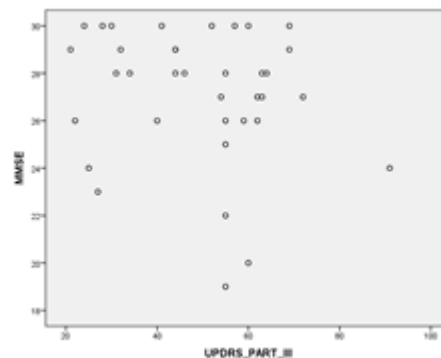


Fig.3. Correlation between PDSS and UPDRS part III

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