

Experience in the use of a multimodal staging system for Parkinson's disease in clinical practice

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ABSTRACT

Objective. The aim of the study was to evaluate the information content of the multimodal staging system for Parkinson's disease in clinical practice.

Material and methods. The study was conducted on the basis of the Regional Clinical Hospital (Odesa). 364 patients with Parkinson's disease were examined. Clinical manifestations were assessed according to the recommendations of Levin O.A. et al. (2019).

Outcomes. Average age of the patients was 64.6 ± 0.5 years, the sample was dominated by men – the gender ratio was 1/1.14. Left-sided lesions were noted in 126 (34.6%) patients, right-sided – in 127 (34.9%), bilateral – in 111 (30.5%). The akinetic-rigid form was observed in 92 (25.3%) cases, trembling – in 27 (7.4%) cases, mixed rigid-trembling in 157 (43.1%) cases, tremulous-rigid in 92 (7.4%) cases.

Stage 1 according to Hoehn-Yahr was determined in 33 (9.1%), stage 1.5 – in 58 (15.9%), stage 2 – in 104 (28.6%), stage 2.5 – in 36 (9.9%), stage 3 – in 102 (28.0%), stage 3.5 – in 6 (1.6%), stage 4 – in 25 (6.9%) cases. No cases of stage 5 were reported.

65.4% of patients had cognitive impairments. 121 (33.2%) patients had pain syndrome of varying severity. Vegetative manifestations of varying severity were observed in 201 (55.2%) patients, affective manifestations – in 170 (46.7%) patients.

Conclusion. The MOSCOVA scale is advisable to detail the criteria for staging within motor and non-motor manifestations of PD.

Keywords: Parkinson disease, diagnosis, non-motor manifestations

INTRODUCTION

Parkinson's disease (PD) is a progressive neurodegenerative disease accompanied by motor disorders (tremor, hypokinesia, rigidity), as well as a number of non-motor disorders (cognitive, affective, vegetative etc.) [1,2]. Such non-motor disorders how depression and dementia affect the quality of life of patients and their relatives and make the greatest contribution to the development of social maladaptation [1,3]. In this regard, the search for effective ways to display the clinical manifestations of PD does not stop.

The modified Hoehn and Yahr scale is the most commonly used classification of PD stages [4]. It re-

lies mainly on the prevalence of movement disorders, their lateralization, as well as the severity of postural instability and other disorders that limit the patient's mobility. Until recently, there was no effective system for presenting a wide range of both motor and non-motor disorders in PD [5]. Recently, Russian specialists have proposed a fundamentally new concept of staging PD, based on the consideration of both motor and non-motor (sensory, autonomic, psychiatric etc.) manifestations of PD, as well as motor or non-motor fluctuations and dyskinesias that occur during long-term therapy with levodopa [6].

The authors propose to divide the clinical symptoms in PD into six categories:

- Motoric
- Obstacles or Complications of treatment (motor fluctuations and dyskinesias associated with drug therapy)
- Sensory (including pain, chronic fatigue, disturbed sleep and wakefulness)
- Cognitive
- Vegetative
- Affective

The latter category includes, along with affective disorders proper, other neuropsychiatric disorders, primarily psychotic ones.

To facilitate the mnemonization of this approach, the authors proposed to combine the first letters of the names of the above categories into the abbreviation MOCKBA (Moscow in Russian) [6,7]. Taking into account the fact that the Cyrillic alphabet is used as the official alphabet only in 15 countries of the world, we propose an abbreviation for the Latin alphabet – MOSCOVA (Motoric, Obstacles, Sensory, Cognitive, Vegetative, Affective)¹. Another feature of this scale is the ability to quantify each domain using a rank scale from 0 to 5 for motor impairments and from 0 to 4 for non-motor disorders. At the beginning of 2022, there was no information on the validation of the scale in large-scale clinical trials, but the proposed approach, in our opinion, deserves attention.

The aim of the study was to evaluate the information content of the multimodal staging system for Parkinson's disease in clinical practice.

MATERIAL AND METHODS

The study was conducted on the basis of the Regional Clinical Hospital (Odessa). 364 patients with Parkinson's disease included in the regional register of extrapyramidal pathology were examined. The scope of the examination complied with the requirements of the Guidelines for the Diagnosis and Treatment of Parkinson's Disease, approved by the Scientific Council of the State Institution "Institute of Gerontology" and MDS recommendations [8].

There were used Beck questionnaire, The King's Parkinson's Disease Pain

Questionnaire (KPPQ), MMSE, UPDRS. The symptoms of the disease were assessed taking into account its clinical picture for the previous month.

Motor disorders were assessed in accordance with the Hoehn-Yahr scale, non-motor disorders - according to the recommendations of Levin O.A. et al. (2019) [7] (Table 1). The staging of development

of sensory disorders (including pain syndromes, akathisia, anosmia, visual impairment) was assessed together with chronic fatigue and sleep and wakefulness disorders.

Additionally, the psychometric parameters (reliability, validity, sensitivity) of the proposed scale were evaluated [9]. Internal consistency and reproducibility were evaluated as reliability parameters. Internal consistency was studied using an analogue of the Cronbach's alpha coefficient for a dichotomous scale, the Kuder-Richardson test. The reproducibility of the scale, i.e., its resistance to measurement errors over time, was determined by the test-retest method. Statistical analysis of the obtained results was performed using the TIBCO Statistica 13.5 software (USA) [10].

OUTCOMES

The average age of the patients was 64.6±0.5 years, the sample was dominated by men - the gender ratio was 1/1.14. At the onset of the disease, left-sided lesions were noted in 126 out of 364 patients, that is, 34.6%, right-sided - in 127 (34.9%), in the remaining 111 (30.5%) - bilateral lesions.

Mixed forms prevailed in the structure of the disease. The akinetic-rigid form was observed in 92 (25.3%) cases, trembling - in 27 (7.4%) cases, mixed rigid-trembling in 157 (43.1%) cases, tremulous-rigid in 92 (7.4%) cases).

The examined patients were distributed according to severity as follows: stage 1 according to Hoehn-Yahr was determined in 33 (9.1%), stage 1.5 - in 58 (15.9%), stage 2 - in 104 (28.6%), stage 2.5 - in 36 (9.9%), stage 3 - in 102 (28.0%), stage 3.5 - in 6 (1.6%), stage 4 - in 25 (6.9%) %. No cases of stage 5 were reported.

Fluctuations associated with taking levodopa were noted only in 87 (23.9%), in most patients they were mild and did not significantly limit activity.

A significant number of patients (238 or 65.4%) had cognitive impairments, the average score on the MMSE scale was 25.3 ± 0.3. A more detailed analysis of the distribution of patients according to the age of onset of the disease indicates that pre-dementia changes were in 82 (15.6%) patients. Accordingly, mild dementia was diagnosed in 15 (2.8%) patients, moderate dementia - in 18 (3.4%).

When analyzing the prevalence of pain syndrome in patients with CP, who were included in the regional registry, it was found that 121 (33.2%) patients had pain syndrome of varying severity. The most common were night pains (21.5%) and muscular-skeletal pains, both isolated (23.1%) and in various combinations. In general, pain with fluctuations of various localization occurred in 27 patients (5.1% of the total number of persons in the registry (n =

¹ MOSCOVA – name of Moscow city in Romanian and in Interlingua, in Milano (Italy) – the name of historical district and metro station

TABLE 1. Evaluation of the clinical manifestations of PD by the MOSCOVA scale

Domain	Scores	Description
Motoric	M0	No motor disorders (H-Y 0)
	M1	Unilateral involvement only usually with minimal or no functional disability (H-Y 1)
	M2	Bilateral or midline involvement without impairment of balance (H-Y 2)
	M3	Bilateral disease: mild to moderate disability with impaired postural reflexes; physically independent (H-Y 3)
	M4	Severely disabling disease; still able to walk or stand unassisted (H-Y 4)
	M5	Confinement to bed or wheelchair unless aided (H-Y 5)
Obstacles	O0	No complications
	O1	Mild fluctuations or dyskinesias limit certain activities
	O2	Moderate fluctuations or dyskinesias limit many activities
	O3	Manifested functional disorders caused by fluctuations or dyskinesias are so pronounced that the patient usually does not carry out many activities or his interaction with others is significantly limited
	O4	Severe functional disorders caused by fluctuations or dyskinesias are so pronounced that the patient usually does not carry out most activities or his interaction with others is severely limited
Sensory	S0	No sensory disorders
	S1	Occasional mild disorders limit certain types of activity
	S2	Disorders are frequent, moderate, limit many types of activity
	S3	Permanent, pronounced disorders limit the patient's activity to such an extent that they usually do not allow him to carry out certain activities or limit his interaction with others
	S4	Disorders (including fatigue, sleep and wakefulness), persistent, severe, and usually exclude the possibility of most activities and severely limit interaction with others
Cognitive	CO0	No cognitive disorders
	CO1	Mild disorders limit certain types of activity
	CO2	Disorders are frequent, moderate, limit many types of activity (moderate cognitive impairment)
	CO3	Manifested disorders that exclude the possibility of certain activities and limit interaction with others (mild dementia)
	CO4	Severe cognitive impairment, usually excluding the possibility of most activities and significantly limiting the patient's interaction with others (dementia)
Vegetative	V0	No disorders
	V1	Occasional mild disorders limit certain types of activity
	V2	Disorders are frequent, moderate, limit many types of activity
	V3	Constant manifested vegetative disturbances precluding the implementation of certain activities and restricting interaction with others
	V4	Permanent severe vegetative disturbances, usually hindering the implementation of most activities and significantly limiting interaction with others
Affective	A0	No disorders
	A1	Mild anxiety or anxiety-depressive disorders, periodic anhedonia, limiting the implementation of certain activities
	A2	Persistent moderately expressed anxiety or anxiety-depressive disorders, extracampine phenomena that limit the implementation of many activities
	A3	Expressed anxiety, depression, apathy, episodic hallucinations, paranoid ideas that are persistent in nature, which usually exclude the possibility of certain activities and limit interaction with others
	A4	severe persistent affective and neuropsychiatric disorders (depression or apathy, hallucinosis, paranoid syndrome, delirium), which usually exclude the possibility of most activities and severely limit interaction with others

527). Nocturnal pain occurred in 94 (17.8%) cases, orofacial pain in 29 (5.5%) cases. Pain associated with edema and signs of inflammation were in 58 (11.0%), radicular pain - in 37 (7.0%).

Some patients had other sensory disturbances (akathisia, anosmia, etc.), chronic fatigue, sleep and wakefulness disorders.

Vegetative manifestations of varying severity were observed in 201 (55.2%) patients, affective manifestations - in 170 (46.7%) patients (Table 2).

When calculating the criterion values, it was found that the global Cronbach's alpha for the proposed method for assessing the severity of the disease was 0.86, while for assessing motor function (M) the values of Cronbach's alpha were 0.77, for complications (O) - 0.68, for sensory disorders - 0.65, for cognitive impairments - 0.69, for autonomic disorders - 0.65, for affective manifestations - 0.66. The reliability coefficient of Krueger-Richardson was $r_{KR}=0.78$ for the studied data array.

TABLE 2. Distribution of patients according to the criteria of the multimodal classification system (MOSCOVA)

Subscale	0		1		2		3		4		5	
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
M	-	-	33	9,1	162	44,5	138	37,9	31	8,5	-	-
O	277	76,1	56	15,4	28	7,7	3	0,8	-	-	-	-
S	243	66,8	55	15,1	22	6,0	21	5,8	3	0,8	-	-
CO	126	34,6	134	36,8	93	25,5	11	3,0	-	-	-	-
V	163	44,8	109	29,9	69	18,9	22	6,0	-	-	-	-
A	194	53,3	148	40,7	13	3,6	9	2,5	-	-	-	-

CONCLUSIONS

The described approach to the complex determination of the stage of PD with the assessment of certain categories of symptoms (motor, cognitive, affective, sensory etc.) was validated on a sample of 364 patients with Parkinson's disease. The results of the

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validation indicate that this scale can be used in clinical practice to assess the dynamics of the state of patients with PD and plan their treatment. It is advisable to detail the criteria for staging within each category of PD symptoms.

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