

ASSESSMENTS OF MOTOR AND NON-MOTOR DISORDERS (ORTHOSTATIC HYPOTENSION) OF PATIENTS WITH PARKINSON'S DISEASE

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Abstract: *The patients with Parkinson's disease have been studied for motor disorders in early, mid, and advanced stages. We have used The Hoehn and Yahr scale and UPDRS (Unified Parkinson Disease Rating Scale) for that. Orthostatic test was used for orthostatic hypotension. As a result, it has been detected that as the disease progresses, motor disorder of the limbs progresses as well. However, orthostatic hypotension was recorded much more often in patients with advanced and late stages of the disease.*

Keywords: *Parkinson's disease, motor and non-motor disorders, orthostatic hypotension.*

Relevance: Parkinson's Disease (PD) – is a chronic and steadily progressive neurodegenerative disease. Despite all recent advances in the treatment of Parkinson's disease, currently, none of the available medications can slow down or stop the progression of the disease. More than 70 per cent of patients die after 15 years of illness and about half of the survivors are in need of care. [1,4,5]. Disability in PD is the result of not only the progression of major motor disorders, but also non-motor disorders. However, there are still unsolved questions, and one of them is assessment of disease progression. Currently, the assessment is carried out clinically, since the data of functional neuroimaging cannot fully reflect the progression of both motor and non-motor disorders. . [2,3,6].

The Purpose of Research: to assess motor and non-motor disorders (orthostatic hypotension) of patients with Parkinson's disease.

Materials and Research Methods.

The research included 90 patients with Parkinson's disease, 31 men and 59 women with an average age of 63,16±10,4 years, with 7,5±3,8 years of duration of illness.

The diagnosis of PD in all patients was confirmed in accordance with UK Parkinson's Disease Society Brain Bank diagnostic criteria . [4,5]. neurological examination with a

quantitative assessment of motor disorders was carried out on the following scales: The Hoehn and Yahr scale . [7]. Unified Parkinson Disease Rating Scale (UPDRS) Version 3 [8,9].

The assessment evidence of motor disorders was carried out during the “ON” period according to III (Motor Examination) of UPDRS scale.

To assess the dynamics of motor and non-motor disorders, 3 groups of patients with different stages of disease were detected in accordance of the progress and the level of disability of The Hoehn and Yahr Scale. Early-stage (I-II stages acc. to The Hoehn and Yahr scale) was diagnosed in 40 (44,4%) patients. 50 (55,5%) patients had diagnosis of mid-stage (III stage acc. to The Hoehn and Yahr scale). And 10 (11,1%) patients had advanced-stage (acc. to The Hoehn and Yahr scale).

Thus, the study group was dominated by patients with progression stage (stage III acc. to The Hoehn and Yahr scale) of PD. To identify non-motor disorders of orthostatic hypotension, an orthostatic test was used.

Results. All examined patients had hypokinesia – rigidity, in 40 (44.4%) patients - resting tremor, in 20 (22.2%) patients - postural (kinetic) tremor, in 30 (33.3%) patients - a change in posture with a predominance of tone in the flexors, which led to specific " flexed truncal posture", 90 (92.4%) - walking disorder; in 65 (7.2%) - postural instability at the advanced late stages. In 25 (27.7%) patients - freezing, 12 (13.3%) of them - freezing while walking in a straight line, in 5 (0.55%) of those patients - orthostatic hypotension, in 5 (5.55%) patients - cognitive impairment, in 3 (3.33%) – hypokinesia appeared with slow motion, difficulty to initiate voluntary movement with frustration of performing sequential movements with a rapid decrease in amplitude and speed. The intensity of hypokinesia, assessed by UPDRS Part III, correlated with the Hoehn and Yahr stage ($r=0,68$; $p<0,05$), the duration of the disease ($r = 0.47$; $p <0.05$), the intensity of walking disorders ($r = 0.66$; $p <0.05$), and postural instability ($r = 0.73$; $p <0.05$).

Rigidity was more intense in the limbs (mainly in the distal regions) and in the neck, characterized by an increase in muscle tone in a static type and was detected during passive muscle stretching. The intensity of rigidity, assessed by part III of the UPDRS, correlated with the stage according to Hoehn and Yahr ($r = 0.55$; $p <0.05$), the duration of the disease ($r = 0.32$; $p <0.05$), the intensity of walking disorders ($r = 0.62$; $p <0.05$), and postural instability - orthostatic hypotension ($r = 0.65$; $p <0.05$).

Resting tremors were present in the distal parts of the limbs with asymmetrical character. Postural (orthostatic hypotension) as well as kinetic tremor of varying stage of intensity, was detected when performing movements and not holding a posture that made it difficult to perform targeted movements or eating.

Movement disorders were represented by freezing, propulsion, flexed posture. Non-motor symptoms: postural instability, orthostatic hypotension and walking disorder. Dysarthria was manifested by slowness of speech (bradilalia), decrease in expressiveness of timbre or loudness of speech with its gradual attenuation, diction disorder, articulation disorder - hypokinetic dysarthria of varying degree of intensity. Sometimes, it was difficult to understand the speech, and in some patients, “speech propulsions” was manifested (tachyphemia or tachyphasia) and tachyllia or dysphonic disorders in the form of slurred speech. In some patients with changes in posture, it was manifested by the predominance of tonus in the flexors that led to a specific "flexed truncal posture", manifested by tilting the head and trunk forward, flexion in the knee and hip joints with adduction of the arms and hips. Cervical dystonia and orthostatic hypotension

were detected. Freezing of gait manifestation assessed according to the part III of the UPDRS, correlated with the stage according to Hoehn and Yahr ($r=0,71$; $p<0,05$), with duration of illness ($r=0,73$; $p<0,05$), with daily dose of levodopa ($r=0,39$; $p<0,05$), and with the duration of levodopa therapy ($r=0,36$; $p<0,05$).

Postural instability and orthostatic hypotension were manifested by a disorder of the ability to maintain balance when changing posture, varying in intensity.

The intensity of motor disorders assessed according to part III of the UPDRS correlated with the stage according to Hoehn and Yahr ($r = 0.79$; $p <0.05$), age ($r = 0.37$; $p <0.05$), duration of illness ($r = 0.53$; $p <0.05$), daily dose of levodopa ($r = 0.69$; $p <0.05$), the duration of levodopa therapy ($r = 0.45$; $p <0.05$).

Table № 1
The intensity of motor disorders of patients with early, mid and advanced stages of Parkinson's disease.

Assessment according to Part III UPDRS (score)	Hoehn and Yahr Stages		
	stage I-II	stage III	stage IV-V
Limbs motor disorders	22,8±5,9	30,6±5,8*	35,6±4,9*
Axial motor symptoms	4,8±2,3	9,3±1,9*	14,6±1,5**

*- differences are statically reliable $p <0,005$,

** - differences are statically reliable $p <0,001$

The intensity of motor disorders in the limbs ($p <0.005$) and axial motor disorders ($p <0.001$), assessed by (motor) part III of the UPDRS, was significantly higher in patients at mid and advanced stages compared with the early stage. At the same time, with the intensity of disease, the intensity of axial motor disorders prevailed over the intensity of motor disorders in limbs (Table 1).

According to Hoehn and Yahr ($r = -0.63$; $p <0.05$), the intensity of axial motor disorders ($r = 0.70$; $p <0.05$) and the intensity of hypokinesia ($r = -0.58$; $p <0, 05$) and rigidity ($r = -0.52$; $p <0.05$), assessed by (motor) part III of the UPDRS by the duration of levodopa therapy ($r = -0.26$; $p <0.05$).

Orthostatic hypotension was detected in 50 (55.5%) of 90 patients.

Table № 2
Orthostatic hypotension of patients with early, mid and advanced stages of Parkinson's disease.

The presence of orthostatic hypotension	Hoehn and Yahr Stages		
	I-II N = 40	III N = 30	IV-V N = 20
	9 (10%)	25 (27,7%)	20 (100%)

In early-stage, 9 (10%) of 40 patients, in mid-stage, 25 (27,7%) of 30 patients, and in advanced stage 20 of 20 patients (100%) had a diagnosis of orthostatic hypotension. Orthostatic

hypotension was significantly more frequent in patients with mid and advanced stages of the disease.

The development of orthostatic hypotension was statistically reliably influenced by the patient's age ($p < 0.05$), the duration of the disease ($p < 0.05$), a daily dose of levodopa ($p < 0.05$), and the duration of taking levodopa drugs ($p < 0.05$) (Table 3).

Table № 3

Comparative characteristics of groups of patients with orthostatic hypotension and without orthostatic hypotension ($M \pm \delta$).

Patients group	Age	Age of onset of PD	Duration of illness	Daily dose of levodopa	Duration of levodopa therapy
with orthostatic hypotension	55,5 ± 9.8	52,2 ± 11.2	8.1 ± 5.2	510,6 ± 201.8	5.6 ± 5.6
without orthostatic hypotension	38,8 ± 10.2 *	47,7 ± 10.8	4,4 ± 3,0 **	343,5 ± 223.8 **	2.0 ± 2.7 **

*- differences are statically reliable $p < 0,005$

** - differences are statically reliable $p < 0,001$

Orthostatic hypotension was registered more frequent in patients older than 65 years with duration of illness more than 5 years, a daily dose of levodopa more than 500 mg, and duration of taking levodopa drugs of 5 years and more.

The development of orthostatic hypotension was statistically reliably influenced by the patient's age, a stage of disease according to Hoehn and Yahr, the duration of the disease, a daily dose of levodopa (more than 500 mg a day), and levodopa therapy (more than 5 years).

Conclusion.

The severity of the disease at an early stage was detected by the main motor disorder in 40% of patients, severe cognitive impairment in 22.4% of patients, symptoms of depression (anxiety, apathy, fatigue, dysphoria) in 60% of patients, orthostatic hypotension in 27.7% of patients and psychotic disorders in 8% of patients, at the advanced stage - predominance of motor disorders, pronounced cognitive impairment in 14.4% of patients, symptoms of depression (apathy, fatigue) in 100% of patients, orthostatic hypotension in 100% of patients, and psychotic disorders in 7.7% of patients. A significant increase in the rate of progression of the main non-motor disorders (cognitive, psychotic, affective, and orthostatic hypotension) was observed in patients with PD in the mid and advanced stages of the disease. A slow rate of progression of the disease was detected in 50 (55.5%) patients, moderate - in 30 (33.3%) patients, rapid - in 10 (11.1%) patients. The factors of the rapid rate of progression were: advanced age, the intensity of motor disorders, the severity of cognitive impairments, the presence of orthostatic hypotension and psychotic disorders, and the severity of motor fluctuations.

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