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Clinical and Pathogenetic Relationship Between Cognitive Impairments in Parkinson's Disease

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Abstract In this abstract presents the relationships between a development of cognitive impairment and the stage of Parkinson's disease. For determined the stages of the disease according to the Hoehn and Yahr scale we divided patients into four groups. Also for analyses we used Parkinson's disease cognitive rating scale and Montreal Cognitive assessment scale.

Keywords Parkinson's disease, Hoehn Yahr, dementia, PD-CRS

1. Introduction

Parkinson's disease (PD) is a chronic, progressive degenerative disease of the central nervous system. Clinical manifestations of the disease include disorders of voluntary movements, such as bradykinesia, tremor, rigidity, and postural instability. Due to the fact that the number of people suffering from PD is growing every year, an urgent question arises about possible ways to predict and prevent this disease. Many studies say that patients with PD in the early stages of the disease have nonspecific neurodynamic changes, which affects cognitive impairment and leads to deterioration as the disease progresses [1,3].

Purpose of study. To investigate the relationship between the severity of motor disorders and cognitive impairment in Parkinson's disease.

2. Materials and Methods

We examined 90 patients with PD in the clinic of the Tashkent Medical Academy in the neurology department. The patients were divided by stages of the disease according to the Hoehn and Yahr scale. The patients also underwent neuropsychological tests to identify cognitive impairment and dementia. Such scales as PD-CRS (Parkinson's disease cognitive rating scale, MOCA (Montreal Cognitive Assessment) scale.

The main criteria according to the above standards are:

- Gender and age of the patient. We have identified both male and female patients according to the standards. The age was verified within 41-75 years.
- Each case, after the examination and diagnosis, was necessarily compared with the criteria established in ICD-10. Comparison was also carried out with the brain bank of the Parkinson's Society [2].
- Evaluated according to the Hoehn Yahr scale: I-IV stages inclusive.
- Evaluation of patient mobility according to the independence criteria: yes/no.

3. Results and Discussion

We determined the stages of the disease according to the Hoehn and Yahr scale; as a result, the patients were divided into the following groups: stage 1-1.5 was diagnosed in 15 (16.6%), stage 2 - in 30 (33.3%) patients; also stage 2.5 - in 23 (25.5%) patients, and stage 3.0 - in 22 (24.4%) patients (Figure 1).

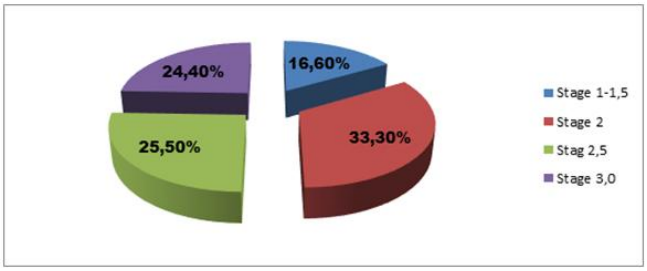

Figure 1. Parkinson's disease stages according to the Hoehn and Yahr scale

Table 1. The Relationship PD-CRS scale with the stage of disease

Scale	Stage1,01,5 (n=15)	Stage 2,0 (n=30)	Stage 2,5 (n=23)	Stage 3,0 (n=22)
PD CRS	15,12 ± 0,12	16,32 ±0,51	13,44 ± 1,1*	12,31± 1.0**

*** significantly differences at the level of p<0.01;**
****significantly differences at the level of p<0.001;**

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The table shows that the majority of patients with Parkinson's disease (58.8%) were patients with stages 2 and 2.5 of the disease. A larger proportion of patients were in the group with a severity stage of 1-1.5 points. Patients with stage 4.0 of the disease did not participate in the study, since the patients' severe motor impairments made it difficult to participate in the studies. In the group of patients who participated in the study, there was a predominance of men 1:1.5, which corresponds to literature data.

According to the PD-CRS scale, speech memory and speech fluency were directly examined. During the development of the disease, a decrease in the effectiveness of the PD-CRS scale was noted (Table 1). As can be seen from the table, at stages 2.5 and 3.0 of the disease development, a decrease in the results of the PD-CRS scale was noted compared to patients at the initial stages of the disease. Thus, a decrease in the test performance indicators was revealed in the group with a degree of severity of motor disorders of 1.0-1.5, 2.0 and 2.5 points. Average score of the group of patients with a degree of severity of motor disorders.

The study of the Montreal Cognitive Assessment Scale results showed significant differences in the performance of the technique ($p<0.01$) between the groups at the disease stage of 1.0–1.5 and 3.0 points, at the disease stage of 2.0–3.0 points, and at the disease stage of 2.5–3.0 points. The average score for disorders of 3.0 was 26.35 ± 1.77. The Montreal Cognitive Assessment Scale includes subscales for assessing memory, visual-spatial perception, attention, time and place, orientation in place, counting, and speech. In the group in which the severity of motor disorders was 3.0 points, the average performance of the MoCA screening scale was 27.3 ± 1.40 points. The presence of mild dementia is considered to be the result of receiving points less than 21. (Table 2).

Table 2. The Relationship MoCA scale with the stage of disease

Scale	Stage 1,01,5 (n=15)	Stage 2,0 (n=30)	Stage 2,5 (n=23)	Stage 3,0 (n=22)
MoCA	25,12 ± 2,01	26,35 ± 1,77	27,3 ± 1,40	23,88 ± 7,12**

****significantly differences at the level of p<0.01;**

Thus, it is obvious that with the development of the disease, the probability of developing cognitive impairment of varying severity increases. In the late stages of the disease, the patient may experience problems with temporal and spatial orientation, the ability to count is reduced, and it becomes difficult for him to copy the picture that is shown to him. The results of the procedure vary most significantly in the third stage of the disease. At this stage, there are patients who fall into different categories related to this technique. It can be said that each patient has a different rate of development of cognitive impairment, and not all patients at the third stage of the disease exhibit severe cognitive impairment. However, the development of the disease itself increases the probability of developing severe cognitive impairment. A significant relationship was found between the severity of motor impairment according to the Hoehn and Yahr scale and the MoCA screening indicator for assessing cognitive status. According to experimental psychophysiological, psychophysiological and clinical-neurological studies, only 12 percent of patients with stage 1.5 Parkinson's disease have mild cognitive impairment. 88% of the examined people did not have cognitive impairment at stage 1.5. The picture changes dramatically at stage 2.5 of the disease. Only twenty percent of the examined people did not have cognitive impairment, and eighty percent had mild cognitive impairment. Dementia was diagnosed in 2% of patients at stage 2.5 of the disease. 50 percent of the examined people were diagnosed with dementia at stage 3 of the disease, and ten percent did not have cognitive impairment.

4. Conclusions

Thus, in the late stages of the disease, cognitive impairment increases, starting with neurodynamic impairment and ending with subcortical-frontal dementia.

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