ONE YEAR FOLLOW-UP STUDY ON COGNITIVE PERFORMANCES IN PATIENTS WITH PARKINSON'S DISEASE

Denisa PIRSCOVEANU[1], Valerica TUDORICA[1], Cornelia ZAHARIA[1], Diana MATCAU[2], Diana STANCA[1], Florin TRIFAN[1]

[1]University of Medicine and Pharmacy, Craiova

[2]University of Medicine and Pharmacy, Timisoara

ABSTRACT

The goal of our study was to assess the cognitive state in patients with Parkinson's disease (PD). We studied 58 patients (23 men and 35 women, mean age 70,1± 4,5 years and mean educational level 11,9 ±1 years). They were admitted to the Clinic of Neurology from Craiova between March 2007- March 2008 for Parkinson Disease. All the patients met the diagnostic criteria for Parkinson's Disease. In this study we included only patients in stage I and II on Hoehn and Yahr scale. Thirty-two patients were in stage I and 26 patients in stage II. The patients were treated with levo-dopa monotherapy, dopaminergic agonists monotherapy, or levodopa associated with dopaminergic agonists. We have also included in our study a control group composed of 62 control subjects with the same range of educational level and age. To assess the cognitive state we tested the patients using Mini Mental State Examination (MMSE) and the revised version of the Addenbrooke's Cognitive Examination (ACE-R) at baseline, after 6 months and one year later. At baseline the patient group showed a mean MMSE score 27,6 and a mean ACE-R score 89,3. The control subjects showed a mean MMSE score 28,7 and a mean ACE-R score 90,1. One year later the patient group showed a mean MMSE score 25,1 and 84,4 mean ACE-R score. The control group showed a mean MMSE score 26,8 and mean ACE-R score 88,2. The patients with PD showed a greater cognitive impairment than the control subjects. We observed that the patients in stage II Hoehn and Yahr had a greater cognitive impairment than patients in stage I. We have also seen in patient group a cognitive decline across every ACE-R cognitive domaine.

Key words: cognitive impairment, Parkinson disease, MMSE, ACE-R.

INTRODUCTION

Parkinson disease (PD) is predominantly characterised as a movement disorder, which affects about 1% of the population over age 60. Over the past years there has been an increasing awareness that the clinical spectrum of PD is much broader, also encompassing many non-motor domains (1). Especially neuropsychiatric symptoms such as depression, psychosis, anxiety and cognitive impairments may contribute to reduced quality of life in PD patients. Dementia is common and affects approximately 40% of PD patients during the course of the disease. (2)

The reported prevalence of dementia in PD varies greatly (2-81%) between studies (3). The dementia associated with PD is characterized by a dysexecutive syndrome affecting mainly executive and visuospatial functions while memory is relatively preserved (2). Cognitive impairment is well recognised in PD but few studies have examined cognitive decline over time in such subjects. A lot

Author for correspondence:
Denisa Pirscoveanu, Neurology Department, Clinical Hospital of Neuropsychiatry, University of Medicine and Pharmacy Craiova, 149 Calea Bucuresti Str, Craiova, 200620
email: denisapirscoveanu@yahoo.com

of aspects of cognitive decline in PD are still unclear because of the use of different and often invalid measurement instruments (4). Standard clinical assessments of cognitive function, such as the MMSE, do not measure all cognitive domains and often have a ceiling effect. ACE-R provides a more comprehensive cognitive assessment allowing several different domains of cognition to be compared.

MATERIAL AND METHODS

Two groups were recruited for this study. Patients group consisted of 58 patients (23 men and 35 women, mean age 70,1 ± 4,5 years and mean education level 11,9 ± 1 years) admitted to the Clinic of Neurology from Craiova between March 2007 - March 2008 for P D. All the patients met the diagnostic criteria for Parkinson's disease (5). Thirty-two patients were in stage I and 26 patients in stage II Hoehn and Yahr Scale. The patients were treated with levo-dopa monotherapy (20 of the patients) or dopaminergic agonists monotherapy (38 of the patients). The second recruited groupe was a control group consisted of 62 (40 men and 22 women) subjects, without PD, mean age 70 ± 4,3 years and mean educational level 12 ± 1,2 years. Upon giving an informed consent, both groups were tested using MMSE (6) and ACE-R (7). The MMSE, designed by Folstein and colleagues from Baltimore in the 1970s, is the most widely used screening measure of cognitive impairment. It has the advantages of brevity, easy administration and high inter-rater reliability. Total MMSE score of 25-30 points is considered normal. A score of less than 24 was initially suggested for distinguishing between impaired and normal subjects, respectively, with a reasonably high degree of specificity and sensitivity. ACE- R was developed in an attempt to provide a test with greater sensitivity to early cognitive decline than the MMSE. ACE-R is a brief cognitive test that assesses five cognitive domains: attention/orientation, memory, verbal fluency, language and visuo-spatial abilities. Total score is 100, higher score indicates better cognitive functioning. Our evaluations were made in the beginning of the study (baseline) than after 6 months respectively 12 months. We compared the results obtained in the patients group with those from control group and we have also followed-up which are the most impaired cognitive functions. Then, we estimated the cognitive performances related to the stage of the disease and also related to the therapy. The results were analysed by Student Test ($p < 0,05$ statistically considerable).

RESULTS

In Table I are represented our demographic findings. No significance between group differences were observed in demographic variables, except for education (it was lower for the patients with cognitive impairment).

At baseline, mean MMSE score in the patient group was 27,6 points and a mean ACE-R score was 89,3 points. The control group showed a mean MMSE score 28,7 points and a mean ACE-R score of 90,1 points. After 6 months, the patients with PD showed a mean MMSE score of 26,9 points and a mean ACE-R score of 87,2 points. The control group showed a mean MMSE score of 27,8 points and a mean ACE-R score of 89,6 points. One year later the patients group showed a mean MMSE score of 26,2 points and a mean ACE-R score of 84,4 points. The control subjects showed a mean MMSE score 26,8 points and a mean ACE-R score 88,2 points.

The assessment of the cognitive preformances related to the stage of the disease showed the next MMSE scores: in the stage I group patients: mean score at baseline was 27,9 points, after 6 months 27,7 points and one year later 27,4 points. In stage II group patients the mean MMSE score at baseline was 27,3 points, after 6 months 26,1 points and after 1 year 25 points. The assessment using ACE-R revealed in stage I group patients a mean score at baseline of 89,6 points, after 6 months 88,4 points and one year later 86,3 points. In stage II group patients the mean ACE-R score was 89,3 at baseline, 86 points after 6 months and 82,5 points after one year. Twelve (60%) of the patients trated

Table I. *The demographic findings in PD patients group and control group*

	Patients group		**Control group**	
	Cognitive impairment	Non-cognitive impairment	Cognitive impairment	Non-cognitive impairment
Age (years)	72±2,1	71±3,1	71±3	70±3,9
Men (number)	13	10	21	19
Women (number)	19	16	12	10
Educational level (years)	9,7±1,2	11,8±1,1	10±1,1	12±1

Table II. *The cognitive domains impaired in the PD patients and control group, using ACE-R evaluation*

Cognitive domain impaired	Patients group (N = 58) n%	Control group (N = 62) n%
Visuospatial abilities	50 (86,20%)	53 (85,48%)
Language	42 (72,41%)	44 (70,96%)
Attention	35 (60,34%)	35 (56,45%)
Orientation	29 (50%)	34 (54,83%)
Verbal Fluency	27 (46,55%)	28 (45,16%)
Memory	19 (32,75%)	22 (35,48%)

with levodopa monotherapy showed a cognitive impairment while 22 (57%) of the patients treated with dopamine agonists. The statistical analyse regarding the most affected cognitive domains is represented on Table II.

CONCLUSION AND DISCUSSIONS

Cognitive impairment plays a role in PD and has important consequences for patient management. Although the cognitive deficits of idiopathic PD are relatively known, their neuropsychological and neurobiological basis are still discussed. Deficits in cholinergic, noradrenergic and dopaminergic mechanism have been proposed as the basis of cognitive impairment of PD. (8) PD can affect cognitive function, causing circumscribed intelectual deficits and even frank dementia. (9-10)

In our study we observed a decrease of the cognitive performances in dynamic during the year study both in group of PD patients and control group. Using MMSE and ACE-R for the cognitive assessment, we observed that the PD patients showed a higher cognitive impairment than the control group, after both 6 months and one year ($p > 0,05$). In the figures 1 and 2 we described the graphics of these findings. Our results are in concordance with other one year follow-up studies that observed a cognitive impairment in patients with

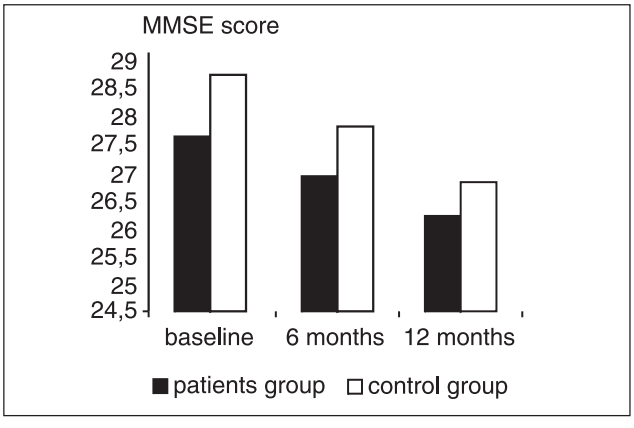

Figure 1. *Mean MMSE score in patients group and control group at baseline, after 6 months and after 12 months*

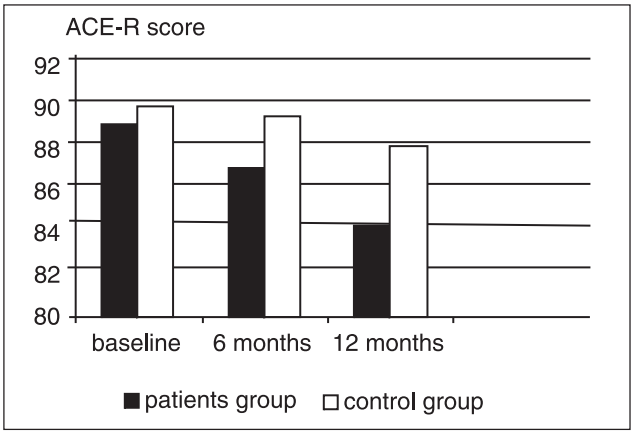

Figure 2. *Mean ACE-R score in patients group and control group at baseline, after 6 months and after 12 months*

PD. There are studies which declare that the risk for the development of dementia in PD patients is approximately 6 times higher than compared to nonPD matched controls. (2)

Generally it is assumed that cognitive impairment may develop early in the disease, but clinical symptoms of dementia appear only on late course of the disease. (11-12)

Regarding the relationship between the stage of PD and the range of the cognitive decline, our data show a higher cognitive impairment at patients in stage II Hoehn and Yahr than those in stage I.($p<0,05$) (Figure 3 and 4). The changes in different cognitive domains have been assessed in several studies. These studies found that the cognitive impairment in PD affects the following domains: executive function, visuospatial abilities (without a specific pattern), language, praxis and verbal fluency. Memory functions seem to be relatively preserved in patients with PD and cognitive decline. (2,8) As ACE-R assess a wide area of cognitive domains, it offered the opportunity to observed which are the most affected cognitive functions in PD patients and in control group during the year of the study. Our conclusion using ACE-R for the cognitive assessment was that in both groups the most impaired were viduospatial abilities, language, and attention.(Table II) When we studied the

relationship between the therapy of PD and the range of the cognitve decline we did not observe a considerable difference between patients treated with levodopa therapy and patients treated with dopamine agonists therapy. They showed approximately the same range of cognitive decline during the year of study.

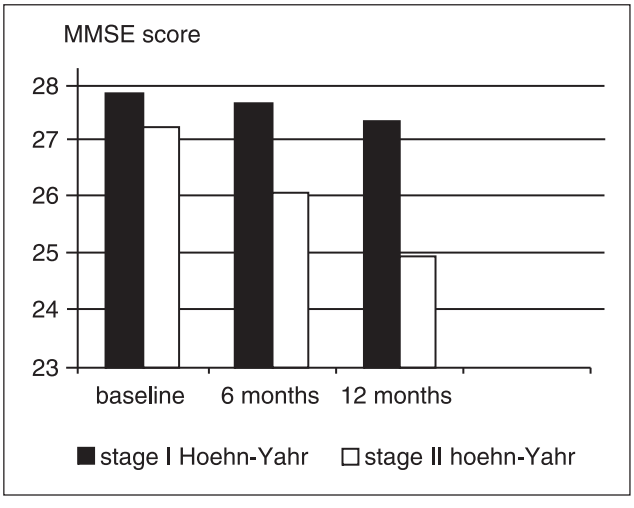

Figure 3. *The assessment using MMSE related to the stage of PD*

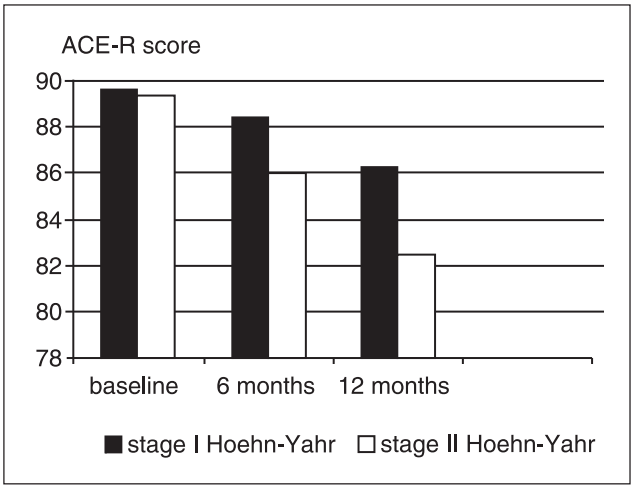

Figure 4. *The assessment using ACE-R related to the stage of PD*

In conclusion, cognition is an important domain of the clinical spectrum of PD and we emphasize the importance of neuropsychological assessment of these patients.

REFERENCES

1. **Chandhiri KR, Healy DG, Schapira AH** – Non motor symptoms of Parkinson Disease: diagnosis and management. *Lancet. Neurol* 2006; 5: 235-45
2. **Dodel R** – Dementia in Parkinson Disease. Orphanet Encyclopedia 2004: 1-5
3. **Emre M** – Dementia associated with Parkinson Disease. *Lancet Neurol* 2003; 2: 229-37.
4. **Verbaan D, Marinus J, Visser M et al** – Cognitive impairment in Parkinson Disease. *J Neurol Neurosurg Psychiatry* 2007; 28:1182-1187
5. **Gelb DJ, Liver E, Gilman S** – Diagnostic criteria for Parkinson Disease. *Arch Neurol* 1999;56:33-39
6. **Folstein MF, Folstein SE, Mc Hugh PR** – Mini Mental State: a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr. Res* 1975; 12:189-198
7. **Hodges J** – Cognitive assessment for clinicians. Oxford University Press 2007;2:157-182
8. **Pillon B, Czernecki V, Dubois B** – Dopamine and cognitive function. *Curr Opin Neurol* 2003;16 Suppl 2: S17-22
9. **Martilla RJ, Rinne UK** – Dementia in Parkinson Disease. *Acta Neurol Scand* 1976; 54: 431-441
10. **Stern J, Mayeux R** – Intellectual impairments in Parkinson Disease. *Adv Neurol* 1986;45: 405-407
11. **Aarsland D, Andersen K, Larsen JP et al** – Prevalence and characteristics of dementia in Parkinson Disease: an 8 year prospective study. *Arch Neurol* 2003; 60:387-92
12. **Fuchs GA, Gemende I, Herting B et al** – Dementia in idiopathic Parkinson syndrome. *J Neurol* 2004; 251(Suppl 6)VI/ 28-32.