



- while swallowing disorders came last – 76 patients/ 25,9% /.
3. The study of motor disorders of patients with Parkinson's disease showed that hypomimia had the highest incidence - in 268 patients / 91,4% /, followed by tremor at rest – in 261 patients / 89% /and muscle rigidity – in 240 patients /81,9%/.
  4. Treatment complications showed the highest incidence of dyskinesia, found in 50 patients / 17% /

Our study showed that mild to moderate bilateral pathological changes, stages between 2,5 and 3 according to the Hoehn and Jahr scale, were most frequently observed – total of 175 patients / 59,7% /, and were equally found in male and female patients suffering from Parkinson's disease. Next came 2 -stage bilateral pathological changes with no impairment of balance - in 55 patients /33,5% /, a little more frequent in female patients.

The unilateral symptoms with axial involvement were comparatively rare – in 30 patients /10,2% /. Unilateral symptoms were the least frequent - in 11 patients/ 3,7% /, while the patients who needed a wheelchair were /0,7% /. The prevalence of patients with 2-3 stage of impairment showed that their treatment had begun relatively late. Up to that moment they had been managing comparatively well (Table 1). Modified Hoehn and Yahr Scale

**Table 1:** Distribution of the patients with Parkinson's disease according to the impairment stage

Impairment stage	men	Gender women	Total
	n %	n %	n %
0 = No signs of disease.			
1 = Unilateral symptoms	2 1,5	7 4,2	9 3
1,5 = Unilateral symptoms plus axial involvement	11 8,5	19 11,5	30 10,2
2,0 =Bilateral symptoms with no impairment of balance	21 16,2	34 20,7	55 33,5
2,5 = Mild bilateral symptoms with posture recovery during the retropulsion test	38 29,4	49 28	87 53
3 = Light to moderate bilateral symptoms;Postural instability in some patients Physically independent	47 36,4	41 25	88 30
4 = Severe disability; patients can still stand and walk unassisted	10 7,7	12 7,3	22 7,5
5 = The patients need a wheelchair or are bedridden unless unassisted	0 -	2 0,7	2 0,7

The results showed that a great part of the patients – 120 (40,9 %) were completely independent and able to do most chores, but they needed twice as much time, i.e. they showed 80% independence. From the rest of the patients included in the study, 59 /20,1%/ were completely independent. 71 of the patients had 60% independence while 20% were dependent

on other people's assistance. Some of the patients could cope with only some of the daily living tasks. There were no gender-related statistically significant differences (Table 2).

Schwab and England Activities of Daily Living Scale

**Table 2:** Distribution of the patients with Parkinson's disease according to their ability to do the activities of daily living

Impairment stage / % /	men	Gender women	Total
	n %	n %	n %
<b>100 %</b> = Completely independent. Able to do all chores with no slowness, difficulty or impairment. They lead a normal life and are not aware of any difficulties.	--	--	--
<b>90 %</b> = Completely independent. Able to do all chores with some slowness, difficulty or impairment. Tasks performed may take twice as long. Conscious of the diff.	19 14,7	24 14,6	43 14,6
<b>80 %</b> = Independent in most chores. Tasks performed take twice as long. Conscious of the difficulties and slowing.	53 41	67 40,8	120 40,9
<b>70 %</b> = Not completely independent. More difficulties with some chores. Three to four times as long for tasks performed. It may take large part of the day for chores.	28 21,7	31 18,9	59 20,1
<b>60 %</b> = Some are dependent. They can do most chores but very slow and with much effort. Errors can be made because the assessment of some patients is impossible.	6 4,6	18 10,9	24 8,1
<b>50 %</b> = More dependent. They need assistance with half of the chores and are very slow. They have difficulties with everyth.	10 7,7	7 4,2	17 5,8
<b>40 %</b> =Very dependent. They need assistance for all chores, but they can still do some of them on their own.	9 6,9	9 5,4	18 6,1
<b>30 %</b> =They do with effort a few chores alone, or only begin them alone. Much help needed.	3 2,3	6 3,6	9 3
<b>20 %</b> = They can do nothing alone. Can be assisted in doing some chores. Severe disability.	1 0,7	2 1,2	3 1
<b>10 %</b> = Totally dependent, helpless. Complete disability.	--	--	--

0 % = Some vegetative functions, such as swallowing. Bladder and bowel not functioning.	--	--	--
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CT scan of the brain was performed in 230 patients (95 men and 132 women). Normal findings were observed in 135 patients (57 men and 78 women), while 95 patients (49 men and 46 women) had pathological changes. *Table 3* shows the distribution of male patients with Parkinson's disease according to the impairment stage, assessed by the modified Hoehn and Yahr scale, and on the basis of the pathological finding. 13 of 49 patients manifested symptoms of the fourth stage according to the scale. In 9 of the cases the CT scan revealed combination of cortical atrophy and multiinfarct encephalopathy, which is to show that the severity of the clinical symptoms correlates directly to the pathological changes, found with the CT scan of the brain. The same correlation was observed in 18 patients with third-stage symptoms. 8 of them also showed the severest combined pathology during the CT scan. 12 patients with 2,5- stage symptoms according to Hoehn and Yahr scale were most frequently diagnosed with total brain atrophy (in 7 patients), while only three patients had more expressed pathological findings. 6 of the patients were diagnosed with symptoms of 2,0 and 1,5 stage; in 4 of them the CT scan revealed total brain atrophy, while 1 patient had single hypodense lesion.

**Table 3:** Distribution of male patients with Parkinson's disease according to the stage of impairment and the pathological CT scan finding

Stage according to Hoehn and Jahr		Pathological CT scan Finding			
	Number	Cortical atrophy	Total brain atropy	Hypodense lesions	Cortical atrophy and multiinfarct encephalopathy
4	13	2	3	-	9
3	18	2	6	2	8
2,5	12	1	7	1	3
2	4	-	4	-	-
1,5	2	-	-	1	-
Total	49	5	20	4	20

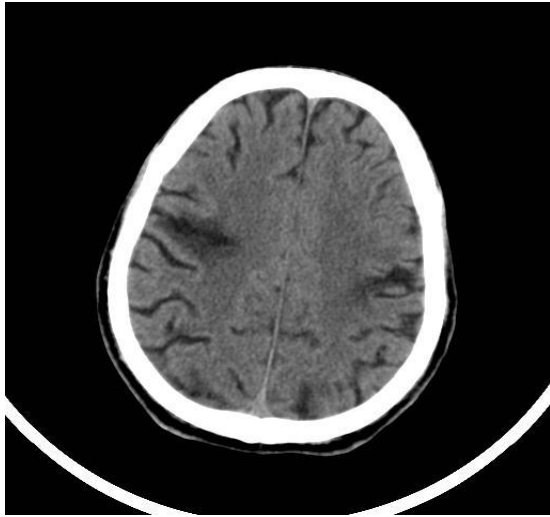


**Figure 1:** CT scan of Male patient with Parkinson's disease. Total brain atrophy.

*Table 4* shows the distribution of female patients with Parkinson's disease according to the impairment stage, assessed by the modified Hoehn and Yahr scale, and on the basis of the pathological CT scan finding. 6 of the patients manifested symptoms of fourth stage according to the Hoehn and Yahr scale. Half of them had a combination of cortical atrophy and multiinfarct encephalopathy. Clinical symptoms of third stage were more frequently observed (in 12 patients). 4 of them had a combination of cortical atrophy and multiinfarct encephalopathy, while 2 of the patients showed cortical atrophy, total brain atrophy and single hypodense lesions respectively. Most frequent were the cases of patients with symptoms of 2,5 stage (14 patients). The most frequent finding in them was total brain atrophy (7 patients), followed by cortical atrophy and single hypodense lesions – three patients for each. The female patients studied, just like the male ones, showed that patients with symptoms in the 2,0 ; 1,5 and 1,0 stage according to the Hoehn and Yahr scale, had more rare and less expressed CT scan pathological findings.

**Table 4:** Distribution of female patients with Parkinson's disease according to the stage of impairment and the pathological CT scan finding

Stage according to Hoehn and Jahr		Pathological CT scan Finding			
	Number	Cortical atrophy	Total brain atrophy	Hypodense lesions	Cortical atrophy and multiinfarct encephalopathy
4	6	3	1	3	3
3	12	2	2	2	4
2,5	14	3	7	3	1
2,0	8	2	3	1	1
1,5	5	3	-	-	1
1,0	1	-	-	1	-
Total	46	13	13	10	10



**Figure 2:** CT scan of Female patient with Parkinson's disease. Multiinfarct encephalopathy

#### 4. Discussion

A study of 122 patients (50 women and 72 men of an average age of 62) with idiopathic Parkinson's disease was conducted. The patients were examined with FP – CIT SPECT, while the severity of the disease was assessed according to the Hoehn and Yahr scale. The analysis of the results showed a significant difference in the FP – CIT SPECT uptake in the subgroup of tremor-dominated patients as compared to those with akinetic-rigid type of Parkinson's disease. (Eggers C et al., 2011). The magnetic resonance changes in the brain of 30 patients of an average age 64,5 were studied together with a control group of 30 healthy volunteers. The severity of the disease was assessed by the Hoehn and Yahr Scale and the Rating Scale. As compared to the control group the patients had significantly more severe impairment in the putamen and substantia (Wang J et al.2011).

The relationship between the white matter alteration (leukoaraiosis) and Parkinson's disease is not completely explained. There are quite a lot of studies of that problem. The ARIC study was conducted in 141 patients with PD, who were grouped in two phenotypes – tremor dominated patients and patients with postural instability and gait difficulties (PIGD). The clinical estimation was done with the UPDRS and Hoehn and Yahr scales. Multivariate logistic regression analysis showed, that leukoaraiosis was independently associated with the PiGD motor phenotype of Parkinson's disease (Lee S et al. 2008). Other studies showed that leukoaraiosis was usually associated with cerebral small vessels disease (Young V 2008, Longstreth W 2009, Smith E 2010), with subtle gait and balance disorders (De Laat K 2011), with rigidity and slowed movements (Acharya H, 2007, Slawek J 2010, Bohnen N 2011) and with cognitive impairment (Gunning – Dixon F 2000, Kuo H 2004). The important question is whether concomitant leukoaraiosis in Parkinson's disease reflects the effect of normal aging, the effect of specific diseases or is due to other pathological processes (Levy G 2007). The lesions in the white matter structure can cause various clinical symptoms, which depend on their anatomical location. In contrast to the more acute lesions in brain stroke and multiple sclerosis, which can

result in sudden sensorimotor deficit, slow white matter aging causes gradual and subtle changes, resulting mainly in cognitive impairment. Such cognitive symptoms have been explained by strategically located white matter lesions in the deep forebrain that may disrupt the cholinergic projection fibers. Imaging studies conducted prove that white matter periventricular lesions are associated with the cortical cholinergic deafferentation in elderly people with leukoaraiosis (Bohnen N, Albin R, 2011). F-fluorodopa Positron Emission Tomography scan showed correlation between the number of dead nigral cells and the clinical symptoms of Parkinson's disease like bradykinesia, muscle rigidity and postural instability (Vingerhoets F et al,1997). To clarify the importance of brain atrophy in relation to the symptoms of Parkinson's disease 173 patients were examined by computed tomography. In 51,4 % of the CT findings pathological brain atrophy was observed. Statistically significant differences of gender and age were found with regard to the extent and localization of brain atrophy. Cortical atrophy also showed a significant dependence on duration of disease. It can be assumed that brain atrophy in Parkinson's patients is more prevalent than in healthy people of the same age (Bacher H , 1979). CT scan examinations of the brain in Parkinson's patients were conducted, where the patients were divided in two groups– patients with dementia and others without dementia. The demented patients were older and more frequently had findings for brain atrophy and leukoaraiosis as compared to the nondemented ones (Levin R, 1994). Systemic studies showed that concomitant vascular pathology can significantly contribute to the clinical manifestations of neurodegenerative dementias. (Schneider J, Benneth D, 2010, Brown W 2009).

There are other studies which, like ours, show that patients with loss of functions for independent life usually complain for the first time during the second and third stages of the disease according to the Hoehn and Jahr scale (Schulman L 2008). Our results show that the CT scan of the brain, though not in the same extent as compared to Nuclear Magnetic Resonance and other highly specialized neuroimaging techniques, can provide sufficient information about the pathological changes in brain parenchyma. These data show a significant degree of correlation with the severity of clinical symptoms, assessed by the modified Hoehn and Jahr scale. That makes the combination of the two methods particularly appropriate for assessment of Parkinson's patients in daily work as the said methods are easily accessible and comparatively less expensive.

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