

Original Research Article

Clinical Study of Movement Disorders in Parkinson's disease

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Abstract

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293 patients suffering from Parkinson's disease, randomly picked, were studied. The patients' condition was assessed by the Unified Parkinson Disease Rating Scale- UPDRS. The modified Hoehn and Jahr scale and the Schwab and England Activities of Daily Life Scale were also used. Electromyography studies of tremor were conducted as well. The results obtained were processed with the help of statistical methods. The movement disorders, that are characteristic of the disease were most frequently observed: hypomimia – in 268 patients (91.4%), tremor at rest – in 261 patients (89%), movement disorders – in 258 patients (88%) and muscle rigidity – in 240 patients (81.9%). A little less frequent were leg agility impairment – in 237 patients (80.8%), posture impairment – in 211 patients (72%) and difficulties in arising from a chair – in 201 patients (68.5%). Speech impairment was the least frequent – in 123 patients (41.9%).

Key words: Muscle rigidity, Parkinson's disease, Tremor

INTRODUCTION

Rigidity is characterized by an increased muscle tone; it is commonly accompanied by the cogwheel rigidity phenomenon and is often related to tremor manifestation. It can affect the proximal muscle groups (neck, shoulders and hips) and the distal muscle groups (wrists, ankles) (Broussolle et al., 2009). Rigidity may be accompanied by pains, usually in one shoulder, and may be misdiagnosed as arthritis and bursitis (Stamey and Jankovic, 2007).

The restless legs syndrome is a movement disorder which is characterized by an irresistible urge to move one's legs and is accompanied with uncomfortable sensations, paresthesia and movement anxiety. These symptoms typically intensify during rest and especially during night sleep (Allen et al., 2005; Gomez et al., 2007). The frequency of occurrence depends on age, gender, and, to a certain degree, on ethnic origin and varies from 0.8% to 18.75% (Guerreiro et al., 2010; Aloe and Tavares, 2006). It affects middle-aged people, more often women. The syndrome was described for the first time in 1945 and its clinical diagnosis has been defined by IRLSSG /International Association of Restless Legs Syndrome (American Academy of Sleep Medicine, 2005).

Postural instability due to the loss of orthostatic

reflexes is most common at the later stages of Parkinson's disease and is usually manifested after the occurrence of other clinical symptoms. Pull tests, in which the patient is quickly pulled backward or forward by the shoulders, are used to measure the degree of retropulsion. Postural instability, together with "freezing" of gait, is the most frequent reason for falls and significantly increases the risk of hip fractures (Williams et al., 2006). The long latency of PD before the appearance of falls differentiates it from other neurodegenerative disorders such as progressive supranuclear palsy and multiple systems atrophy. Several other factors also influence the occurrence of postural instability in PD patients. They include other parkinsonian symptoms, orthostatic hypotension, age-related sensory changes and impaired ability to integrate visual vestibular proprioceptive sensory input (kinesthesia et al., 2002).

Aim

Study of the frequency of occurrence of movement dis-

Table 1. Frequency of occurrence of hypomimic disorders in Parkinson's disease

Clinical symptom – stage of impairment	Men		Gender Women		Total	
	n	%	n	%	n	%
0= normal						
1= slight hypomimia, could be normal „poker face”	39	30,2	64	39	103	35,1
2= slight but definite abnormal diminution in expression	56	43,4	47	28,6	103	35,1
3= moderate hypomimia, lips parted from time to time	25	19,3	31	18,9	66	22,5
4= masked or fixed face with severe or complete loss of expression; lips parted ¼ of inch or more	0	-	6	3,6	6	2
TOTAL	120	93	148	90,2	268	91,4

Table 2. Frequency of tremor in Parkinson's disease

Clinical symptom – stage of impairment	Men		Gender Women		Total	
	n	%	n	%	n	%
0= absent						
1= slight, infrequently present	9	6,9	26	15,8	35	11,9
2= mild-amplitude and persistent. Moderate and intermittent	85	65,8	87	53	172	58,7
3= moderate amplitude and present most of the time	20	15,5	23	14	43	14,6
4= marked amplitude and present most of the time	1	0,7	10	6	11	3,75
TOTAL	115	89,1	146	89	261	89

orders in patients diagnosed with Parkinson's disease

MATERIAL AND METHODS

293 patients with Parkinson's disease (129 men and 164 women) aged 58-79 years, randomly picked over an 8-year period (2005-2012) were studied.

The study used the following assessment tools:

- I. Unified Parkinson's disease rating scale – UPDRS
- II. Modified Hoehn and Yahr scale for assessment of clinical symptoms
- III. Schwab and England Activities of Daily Living Scale
- IV. Electromyographic studies of tremor (tremorograms) performed with EMG equipment
- V. Statistical methods for processing the data received – SPSS statistics software was used

RESULTS

Almost half of the men and women included in the study

and diagnosed with Parkinson's disease showed different stages of speech disorders. Mildly affected speech with impaired articulation and/or volume of speech was most frequently found, followed by monotonous and slurred, but still intelligible speech. These disorders prevailed among women as compared to unintelligible speech, found in 5 women (1.7%). The same pattern was observed among the men with Parkinson's disease.

Hypomimia is very common symptom of Parkinson's disease. It was found in (268 / 91.4) of our patients. (Table 1). Slight hypomimia and slight but definitely abnormal diminution of expression were with equal frequency of occurrence - in 103 patients from both groups (35.1%). These frequencies were statistically significant as compared to masked or fixed face with severe, or complete loss of expression - in 6 patients (2%), ($p < 0.05$ %). 56 patients (19.1%) showed moderate hypomimia with lips parted from time to time.

Static tremor is one of the main symptoms of Parkinson's disease. It was found in (261 / 89%) of our patients (Table 2).

Mild-amplitude and persistent tremor occurred most

Table 3. Frequency of action and orthostatic tremor of hands in Parkinson's disease

Clinical symptom – stage of impairment	Men		Gender Women		Total	
	n	%	n	%	n	%
0= absent						
1= slight, present with action	36	27,9	57	34,7	93	31,7
2= moderate in amplitude, present with action	38	29,4	43	26,2	81	27,6
3= moderate in amplitude with posture holding and action	31	24	23	14	54	18,4
4= marked in amplitude, interferes with feeding	1	0,7	10	6	11	3,7
ОБЩО	106	82,1	133	81	239	81,5

Table 4. Frequency of muscle rigidity in Parkinson's disease

Clinical symptom – stage of impairment	Men		Gender Women		Total	
	n	%	n	%	n	%
0= absent						
1= slight, detectable only with mirror movements	24	18,6	30	18,2	54	18,4
2= mild to moderate	25	19,3	70	42,6	95	32,4
3= marked, but full range of movement easily achieved	43	33,3	28	17	71	24,2
4= severe, range of movement achieved with difficulty	4	3,1	16	9,7	20	6,8
TOTAL	96	74,4	144	87,8	240	81,9

frequently – in 172 patients (58.7%). Its frequency increased significantly as compared to the marked-amplitude tremor, present most of the time - in 11 patients (3.75%), ($P < 0,01$ %). Slight, infrequently present tremor and mild-amplitude tremor came next, the occurrence among women being more frequent than among men.

Action and orthostatic tremor are often observed in Parkinson's disease. Its incidence may be higher than 92% of the cases. / Forssberg H, Ingvarsson P, Johansson R, 2000/. This type of movement disorder was found in 239 patients /81,5 %/, the frequency of occurrence being slightly higher in women as compared to men (Table 3)

Slight action tremor prevailed as compared to the marked-amplitude one, which interferes with feeding / $p < 0,05$ %/. Moderate-amplitude tremor present with action and moderate-amplitude tremor with posture holding and action came next.

Muscle rigidity is the second main clinical symptom, which, together with tremor at rest, characterizes Parkinson's disease. Muscle rigidity was found in a larger number of patients - 240 /81.9% (Table 4).

Mild to moderate rigidity prevailed, and it occurred much more frequently than the severe rigidity in which

the range of movement is achieved with difficulty ($p < 0.05$ %). Additionally, mild to moderate muscle rigidity was much more frequent in women than in men ($p < 0.05$ %). On the other hand, the marked rigidity with full range of movement prevailed insignificantly in men as compared to women.

Finger taps, where patients tap thumb with index finger in rapid succession, was also a very frequent symptom found in our study - in 230 patients (78.4%).

Moderate disorders, occurring with single arrests in movement, were much more frequent as compared to the severely restricted range of movement ($p < 0.01$ %). Mild slowing and/or reduction of amplitude also occurred more frequently ($P < 0.05$ %). Severe disorders or "arrests" of movement were observed in 30 patients (10.2%).

Rapidly alternating hand movements, where patients open and close hands in rapid succession, was found in 258 patients (88%). Mild and moderate slowing, accompanied by reduction of amplitude, and occasional arrests of movement had almost equal frequency - in 100 patients (34.1%) and in 106 patients (36.1%) respectively. These disorders occurred much more frequently as compared to cases when the patients could barely perform any ($p < 0.01$ %). Severe disorders with frequent hesitations in initiation and arrests in ongoing

Table 5. Frequency of movement disorders in Parkinson's disease.

Clinical symptom – stage of impairment	Men		Gender Women		Total	
	n	%	n	%	n	%
Movements/ the patient opens and closes hands in rapid succession/						
0= normal						
1= mild slowing and/ or reduction of amplitude	41	31,7	59	35,9	100	34,1
2= moderately impaired. Fatigue. Occasional „arrests“ of movements	45	34,8	61	37,1	106	36,1
3= severely impaired. Frequent hesitation in initiation or „arrests“ in ongoing movements	21	16,2	23	14	44	15
4= can barely perform the task	2	1,5	6	3,6	8	2,7
TOTAL	109	84,4	149	90,8	258	88

movements were less frequent (Table 5).

Most frequently observed, more frequent in women than in men, were mild slowing and rapid opening and closing of hands - in 118 patients (40.2%), and followed by moderate impairment with occasional arrests of movement - in 90 patients (30.7%). They occurred much more frequently than the most severe stage of impairment, when the patients could barely perform any task - 6 patients (2%), ($p < 0.01\%$) and ($p < 0.05\%$) respectively.

Impairment of leg agility was often observed - in 237 (80.8%) of the patients. The percentage of mild slowing, sometimes combined with reduction of amplitude, was the highest – in 121 patients (41.2%), followed by moderate impairment, accompanied with occasional arrests of movement – in 85 patients /29 % /. Their values were significantly higher than those of patients who could barely perform any task - 4 patients (1.3%).

Difficulties in arising from a chair were found in 201 patients (68.5%), the frequency of occurrence being almost equal in men and women.

Milder impairment stages, namely slow arising when the patient might need more than one attempt and pushing self up from arms of seat, were considerably more frequent than the occasional ones, when the patient was unable to arise without assistance ($p < 0.05\%$).

Stooped posture is a frequent symptom of Parkinson's disease. That pathological disorder was found in 211 patients (72%). Slightly stooped posture was found in both genders with equal frequency, followed by moderately stooped posture. Their frequency of occurrence prevailed significantly over the marked flexion with extreme abnormality of posture ($p < 0.05\%$). Severely stooped posture with kyphosis was less frequently observed, the frequency being equal for both genders.

Gait disorders were also very frequent in men and women diagnosed with Parkinson's disease - in 197 patients (67.2%).

Slow walk with short steps was most frequently observed, followed by difficult walking with, or without, assistance. They were much more frequent than inability to walk ($p < 0.05\%$) and prevailed insignificantly in patients with severely disturbed gait who needed assistance.

Impaired postural stability was found in about half of the patients - 169 (57.6%). Retropulsion where the patient recovered unaided was most frequent – in 84 patients (26.8%). This frequency differed significantly from that of patients unable to stand without assistance - in 8 patients (2.7%). The absence of posture response and the instability with a tendency of spontaneous loss of balance were almost equal in frequency. No statistically significant gender-related differences were observed.

Body bradykinesia and hypokinesia were found in 196 (66.8%) of our patients. Mild slowness, accompanied with poverty of movements was found most frequently – in 21.5%. Marked slowness with small amplitude was observed only in 4.7% of the patients.

DISCUSSION

Speech disorders are a frequent symptom of Parkinson's disease (Miller and Cronin-Golomb, 2010; Jankovic, 2008).

Hypomimia is observed in most of the patients diagnosed with Parkinson's disease (Jankovic, 2008).

Tremor affects different body parts. It has been reported that in some patients it is more markedly expressed in the side of the body in which the parkinsonian symptoms are more severe. Considerable reduction of amplitude of tremor has been observed

after administration of single-dose dopaminergic and cholinergic drugs.

Tremor at rest of head, upper and lower extremities is one of the main symptoms of Parkinson's disease (Louis et al., 2009; Shahed and Jankovic, 2006; Marshall and Grosset, 2003).

Action or orthostatic tremor of hands has been often found in other studies as well (Chaudhuri et al., 2005).

A prospective study of 6038 persons, mean age 68.5 years, with no evidence of dementia or parkinsonism, found that the presence of stiffness, tremor and imbalance were each associated with increased risk for PD development (De Laus et al., 2006). Among this cohort 56 new cases of Parkinson's disease were identified over a period of 5.8 years. Furthermore, rigidity of neck and trunk /axial rigidity/ may occur, resulting in abnormal axial postures, scoliosis for example. Orthostatic instability, resulting in flexed neck and trunk posture, is often associated with rigidity. Limb deformations may also develop in some patients (Ashour and Jankovic, 2006).

The pathophysiology of the restless legs syndrome is still unclear. In some cases it can be explained by genetic susceptibility, while in others - by the presence of diseases such as neuropathy, iron deficiency, renal insufficiency, pregnancy and rheumatoid arthritis. For that reason in most cases the serum ferritin and electrolytes must be analyzed (Ondo, 2009). Family cases of this syndrome show autosomal dominant inheritance pattern and are well studied. Recent clinical and laboratory results show dopamine metabolism disorder. That is why dopaminergic drugs are regarded to be efficient in the therapy of these cases (Borreguero et al., 2003).

Gait disorders may sometimes be associated with levodopa use (Sethi, 2008). Fear of falling may additionally impair the balance of PD patients. As might be expected, the frequency of falls correlates to the severity of the disease. Dopaminergic therapy, pallidotomy and deep brain stimulation may improve some axial characteristics (Roberts- Warrior et al., 2000).

The slowing of movements with progressive amplitude or speed loss in performing rapid repetitive movements is called bradykinesia (Edwards et al., 2008). It is of paramount importance to differentiate between bradykinesia and simple slowing, which is often observed in patients with reduced muscle strength (paresis) or reduced motivation (in depression for example). In fact, this is the main reason for wrong diagnosing. From a clinical point of view bradykinesia may be assessed by asking the patient to perform some repetitive movements as quick as possible and with the widest possible amplitude, namely opening and closing of hands, thumb and finger taps or rapid foot tapping. The investigator should pay attention to the occurrence of gradual slowing and/or amplitude loss, which could lead to complete "freezing". Bradykinesia may also be found by looking for

spontaneous movements in patients while they are sitting, arising from a chair or walking. Other clinical manifestations of bradycardia are hypomimia, masked fixed face, the so called "poker face", hypophonia and micrographia.

CONCLUSION: Provide

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