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RESEARCH ARTICLE

# The association between symptoms of sexual dysfunction and age at onset in Parkinson's disease

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**Abstract**
*Objective* Age at onset in Parkinson's disease (PD) seems to be related nonmotor symptoms. In this study we investigated the effect of the age at onset on symptoms of sexual dysfunction (SSD) in patients with PD.
*Methods* This prospective study comprised 22 consecutive outpatients with early onset PD (EOPD—onset of the disease before 55 years), and 66 outpatients with late onset PD (LOPD—onset of PD over 55 years). They were all recruited from the Department of Movement Disorders, Clinic of Neurology. The diagnosis was established according to the UK PD Brain Bank Criteria by a movement disorders specialist. The Unified PD Rating Scale (UPDRS) motor was used to assess motor disability and Hoehn and Yahr (H&Y) stage was used to establish disease severity. The sexual functions of the patients were rated by applying the Arizona Sexual Experiences Scale (ASEX).
*Results* Thirteen EOPD patients (59.09 %) and 53 of the LOPD patients (80.3 %) ($p$ 0.047) reported dissatisfaction with at least one item of ASEX. There were no differences between H&Y stages ($p$ 0.205) UPDRS total ($p$ 0.267) and motor scores ($p$ 0.100) between groups. LOPD patients had significantly higher ASEX scores than EOPD patients ($p$ 0.001).
*Interpretation* Sexual dysfunciton occurs more frequently and more severely in LOPD than EOPD patients. PD patients with different ages at onset clinically present differently in terms of SSD.

**Keywords** Parkinson's disease · Symptoms ofsexual dysfunciton · Age at onset

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## Introduction

Parkinson's disease (PD) is a chronic aging-related neurodegenerative disorder, characterized by preferential loss of dopaminergic neurons in the substantia nigra and, deposition of alpha-synuclein in several areas of the central and peripheral nervous system [1, 2]. Neuronal degeneration is also present in the dorsal nucleus of the vagus in the medulla and other brainstem nuclei [2]. In patients with PD, Lewy bodies are seen in the substantia nigra, the basal nucleus of Meynert, locus ceruleous, cerebral cortex, sympathetic ganglia, the dorsal vagal nucleus, the myenteric plexus of the intestines, and the sympathetic cardiac plexus [3]. Patients with PD have a wide spectrum of motor and non-motor symptoms (NMS) [1]. It has shown that NMS are common in PD patients [4–6]. The spectrum of nonmotor symptoms (NMS) includes neuropsychiatric, autonomic and sensory symptoms, sleep disorders and sexual dysfunction (SD) [1, 4–6]. SD is extremely common in PD [7, 8]. Autonomic dysfunction is frequently responsible for this symptom. However, motor, psychological, cognitive disturbances, pharmacologic, and social reasons are also other possible causes [7, 8].

Although PD is an age-related disorder and usually develops after the age of 65, 15 % of cases manifest earlier in life. Firstly, Quinn et al. [9] used the term ''young-onset Parkinson's disease'' for patients diagnosed before 40 years of age, then other studies increased the age range to include 50–55 years [10, 11]. Patients with early-onset PD (EOPD) usually have a slower disease progression, an increased risk of dystonia, a lower rate of dementia, an increased rate of depression an increased rate of levodopa-induced motor complications [11, 12]. Sexual dysfunction was reported among young patients with PD [13, 14]. Guo et al. found that sexual dysfunction was more frequent in EOPD patients than late onset PD (LOPD) [15]. It is suggested that in the pathogenesis of EOPD, genetic factors may have a more important role than in LOPD [16].

Our study aimed to estimate the effect of the age at onset of symptoms of sexual dysfunction (SSD) in patients with PD. We investigated whether the age at onset of PD was related to SSD.

## Material and methods

### Subjects

Our study included PD patients who attended the Department of Neurology, Ordu University School of Medicine between January 2013 and June 2014. This prospective study comprised 22 consecutive outpatients with EOPD (onset of the disease before 55 years), and 66 outpatients with LOPD (onset of PD over 55 years). They were all recruited from the Department of Movement Disorders, Clinic of Neurology.

### Questionnaires

Patients who had been previously diagnosed with PD by a neurologist were re-evaluated by a movement disorders specialist (Prof. F. Ö). It was verified that subjects met the UK PD Brain Bank Criteria [17] and were suffering from PD, and the age of onset of the disease was confirmed based on the findings during re-evaluation. The Unified PD Rating Scale (UPDRS) motor [5] was used to assess motor disability and Hoehn and Yahr (H&Y) stage [18] was used to establish disease severity. Cognitive function was assessed by the Turkish version of mini-mental state examination (MMSE) [19, 20]. Patients who had scored >24 were included in the study. Patients were also administered the Turkish version of Hamilton depression (HAM-D) [21, 22] and anxiety rating scales (HAM-A) [23, 24]. Those patients who scored >8 points on the scale were considered to have depression. Those patients who scored >6 points on the scale were considered to have anxiety.

The sexual functions of the patients were rated by applying the Turkish version of the Arizona Sexual Experiences Scale (ASEX) [25, 26]. According to the ASEX, a total score between 5 and 30 can be reached from five groups (ASEXtotal, ASEXsexual desire, ASEXstimulation, ASEXerection/lubrication, ASEXorgasm, ASEXorgasm satisfaction) each between 1 and 6 points. Lower scores indicate a strong, easy, and satisfying sexual response, whereas higher scores reflect the presence of SSD. Patients were examined for lower urinary tract symptoms by the urologist and those who had these symptoms were excluded. Patients who had cognitive impairment, depression, anxiety, encephalitis, stroke, head trauma, treatment with neuroleptics or if they had atypical features for PD or secondary parkinsonism were excluded from the study. Only patients who answered all of the questions were included the study. The study was approved by the local ethics committee.

### Statistical analysis

All data were analyzed using SPSS 20. All continuous data were shown as the mean ± standard deviation. For comparisons, the Student's *t* test was applied as the variables met the normal distribution, whereas the Mann–Whitney *U* test was used for the variables that did not meet the norms for using parametric statistics. Statistical comparisons regarding the prevalence of NMS between EOPD and LOPD patients were performed using Chi square test. For all correlations, the Pearson correlation coefficient was used for continuous and the Spearman for ordinal and nominal variables. A value of $p < 0.05$ was considered statistically significant.

## Results

### Subjects characteristics

Among 88 patients, 54 (61.4 %) patients were males and 34 (38.6 %) were females, 22 (25 %) patients were EOPD and 66 (75 %) were LOPD. The demographic and clinical features of the study patients are listed in Table 1.

### Sexual dysfunction questionnaires

Thirteen patients (59.09 %) of EOPD patients and 53 of LOPD patients (80.3 %) ($p$ 0.047) reported dissatisfaction, at least, one item of ASEX. There were no differences between H&Y stages and UPDRS scores between groups. There were statistical differences in ASEX total scores between EOPD and LOPD. LOPD patients had significantly higher ASEX scores than EOPD patients. Symptoms of sexual dysfunction were more common in age at onset in

**Table 1** Demographic and clinical features of the study PD patients

| | EOPD ($n = 22$) | LOPD ($n = 66$) | $p$ |
|---|---|---|---|
| Age (years) | 59.23 ± 6.59 | 70.53 ± 6.638 | <0.001** |
| Age at onset (years) | 49.64 ± 4.79 | 64.91 ± 5.93 | <0.001** |
| Gender (male/female) | 13/9 | 41/25 | 0.80 |
| Disease duration (years) | 9.59 ± 5.94 | 5.59 ± 3.44 | <0.001** |
| Levodopa equivalent dose | 292.86 ± 148.52 | 272.37 ± 217.29 | 0.763 |
| H&Y stage | 1.58 ± .507 | 1.77 ± .572 | 0.205 |
| UPDRS total | 24.63 ± 13.21 | 28.46 ± 14.14 | 0.267 |
| UPDRS motor | 13.909 ± 8.27 | 17.59 ± 9.21 | 0.100 |
| ASEX total | 14.77 ± 5.82 | 20.74 ± 7.37 | 0.001* |
| MMSE score | 27.54 ± 1.56 | 26.95 ± 1.78 | 0.518 |
| HAM-D score | 8.63 ± 7.36 | 12.27 ± 10.24 | 0.128 |
| HAM-A score | 5.15 ± 4.23 | 8.20 ± 6.59 | 0.057 |
| Presence of hypercholesterolemia | 2 | 11 | 0.386 |
| Presence of hypertension | 3 | 18 | 0.194 |
| Presence of diabetes mellitus | 2 | 6 | 1 |

* $p < 0.05$

** $p < 0.001$

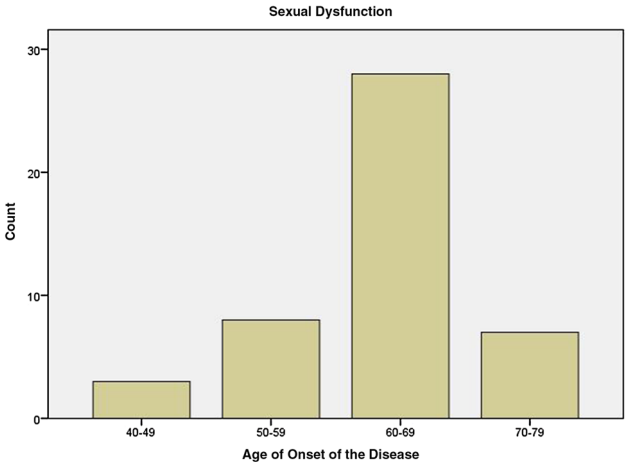


**Fig. 1** Distribution of symptoms of sexual dysfunction according to age at onset

60–69-year-olds (Fig. 1). The frequency of each item of ASEX between EOPD and LOPD were shown in Table 2. The most frequent ASEX item observed in our patients was erection/lubrication: 51 (52.04 %), followed by orgasm: 48 (48.97 %), orgasm satisfaction: 44 (44.9 %), stimulation: 43 (43.87 %), and sexual desire: 40 (40.81 %). Scores of each ASEX item between EOPD and LOPD are shown in Table 3. All items of ASEX scores were worse in LOPD than in EOPD.

### Correlation between patients' features

The correlations between the ASEX scores and clinical variables are listed in Table 4. Positive correlations between age at onset with ASEX scores were observed in all patients, but these correlations did not appear in LOPD and EOPD groups.

### Symptoms of sexual dysfunction differences between men and women

Scores of each ASEX item between males and females are shown in Table 5.

**Table 2** Presence of SSD according to each ASEX item between EOPD and LOPD

| | Presence of SSD | | |
|---|---|---|---|
| | EOPD ($n = 22$) (%) | LOPD ($n = 66$) (%) | $p$ |
| Sexual desire | 5 (22.72) | 35 (53.03) | 0.013* |
| Stimulation | 3 (13.63) | 40 (60.60) | 0.000** |
| Erection/lubrication | 7 (31.81) | 44 (66.66) | 0.004* |
| Orgasm | +97 (31.81) | 41 (62.12) | 0.013* |
| Orgasm satisfaction | 6 (27.27) | 38 (57.57) | 0.014* |

* $p < 0.05$

** $p < 0.001$

**Table 3** Scores of each ASEX item between EOPD and LOPD

| | ASEX scores | | |
|---|---|---|---|
| | EOPD ($n = 22$) | LOPD ($n = 66$) | $p$ |
| Sexual desire | 2.64 ± 1.49 | 3.95 ± 1.70 | 0.002* |
| Stimulation | 2.64 ± 1.39 | 4.06 ± 1.65 | <0.001** |
| Erection/lubrication | 3.36 ± 1.52 | 4.36 ± 1.46 | 0.007* |
| Orgasm | 2.95 ± 1.39 | 4.11 ± 1.70 | 0.005* |
| Orgasm satisfaction | 3.18 ± 1.46 | 4.17 ± 1.72 | 0.018* |

* $p < 0.05$

** $p < 0.001$

**Table 4** Correlations of ASEX total scores and clinical features

| | All patients (p/r) | EOPD (p/r) | LOPD (p/r) |
|---|---|---|---|
| Age (years) | 0.001*/0.34 | 0.66/0.10 | 0.13/0.19 |
| Age at onset (years) | 0.002*/0.33 | 0.16/−0.31 | 0.11/0.20 |
| Disease duration (years) | 0.58/0.06 | 0.20/0.29 | 0.84/0.02 |
| H&Y stage | 0.03*/0.25 | 0.87/−0.40 | 0.10/0.22 |
| UPDRS total | 0.41/0.09 | 0.74/−0.08 | 0.79/0.04 |
| UPDRS motor | 0.42/0.87 | 0.89/−0.29 | 0.95/.0.01 |

* $p < 0.05$

** $p < 0.001$

**Table 5** Scores of each ASEX item between males and females

| | ASEX scores | | |
|---|---|---|---|
| | Male ($n = 54$) | Female ($n = 34$) | $p$ |
| Sexual desire | 2.80 ± 1.48 | 4.97 ± 1.26 | 0.000** |
| Stimulation | 2.98 ± 1.52 | 4.82 ± 1.31 | 0.000** |
| Erection/lubrication | 3.72 ± 1.35 | 4.76 ± 1.64 | 0.002* |
| Orgasm | 3.19 ± 1.60 | 4.85 ± 1.34 | 0.000** |
| Orgasm satisfaction | 3.35 ± 1.63 | 4.85 ± 1.43 | 0.000** |

* $p < 0.05$

** $p < 0.001$

## Discussion

To our knowledge, our study is the first study focused on analyzing the differences in SSD between EOPD and LOPD patients. Therefore, we could not compare these age groups to the well-reported literature or age match within our population. In previous studies, SD was investigated as a domain of NMS between EOPD and LOPD by other authors [15, 27]. Guo X. et al. reported that the SD was more common in EOPD [13]. In contrast, Spica V. et al. found that dribbling of saliva, change in libido and difficulty in sexual activities were significantly more frequent in LOPD [27].

Whereas NMS of PD have an essential impact on the patient's quality of life, these problems have not received enough attention in recent times. SD is one of the common NMS of PD, which can occur all stages of the disease. Although sexual functions have an important effect on quality of life, only a few patients get help for SD [28]. The lack of symptom recognition may deny patients adequate treatment.

We found that SSD is common in PD patients with a frequency of 75 % among all patients. In the literature, sexual symptoms in patients with PD range from 37 to 65 % [7, 28]. SSD was more frequent and the severity of SD was worse in LOPD group than EOPD group. Similar to our study, Spica et al found that SSD was more common in LOPD patients [27].

This study showed that SSD with all its items was more severe in LOPD patients than in EOPD patients. LOPD patients presented with more severe scores for all items of ASEX than EOPD patients. Subject age, age at onset of disease, and H&Y stage, contribute to the severity of SSD in spite of disease duration and UPDRS scores.

In our study, another important finding was that the duration of the disease was longer in EOPD group, although they had similar H&Y stages. It gives rise to the thought that EOPD patients have a slower disease progression which is consistent with the findings of previous studies [12, 29].

Sexual function declines with advanced age, and after excluding the effect of aging, trying to detect the PD-related effects on sexual function is not easy. Unfortunately, in our study EOPD and LOPD groups did not match according to ages. LOPD patients were considerably older than the EOPD patients. Kummer et al. reported that most important factors in the development of SD was aging and female gender [14]. Likely to Kummer et al.'s study, SD was more frequent in LOPD group.

In contrast to Guo et al. [15], our study suggested that LOPD patients might have an increased risk for SD than EOPD. Whereas, results of other studies were in agreement with our study [27, 30].

In this study, positive correlations between age, age at onset, H&Y stage, and the total ASEX score indicate that PD patients who are older and with late-onset are more likely to experience symptoms of sexual dysfunction. These findings were consistent with other studies [4, 6]. These results considered as SSD should be in a relationship to the progression of PD. However, the absence of any correlations of ASEX scores both in LOPD and EOPD groups, suggests that these variables do not have so much importance on the severity of SSD between groups, or it may be related to the number of the small number of subjects included in the two groups.

The Lewy bodies in midbrain dopaminergic neurons are considered to be responsible for the non-motor symptoms of PD [31]. The differences in the distribution and severity of pathology in the central nervous system between EOPD

and LOPD patients may be affecting the non-motor features [15]. Both dopaminergic and non-dopaminergic mechanisms might be leading to an insufficient response to dopaminergic therapy [32].

The main limitations of our study include: (1) the small number of the patient groups, because our data contain only one center's patients and includes more "mild to moderate" PD cases, as opposed to "severe" cases, (2) we do not have a control group of subjects without PD, but similar in age.

This study indicates that SSD differs by the age of the onset of the disease processes in PD patientsSD. When compared to EOPD, LOPD is characterized by more severely impaired sexual functions such as sexual desire, stimulation, erection/lubrication, orgasm, and orgasm satisfaction. These results may suggest the distinct types of neurodegeneration occurring in LOPD and EOPD.

**Compliance with ethical standards**

**Financial support** This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

**Conflicts of interest** The authors report no conflict of interest.

**Ethical standards** The authors assert that all procedures are contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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