

# Effect of bladder dysfunction on development of depression and anxiety in Parkinson's disease

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**Summary** *Objectives: Parkinson's disease (PD) often presents with movement disorder. However, besides motor complaints, there are many complaints such as anxiety, depression, urinary complaints and constipation. The aim of this study was to investigate whether neurogenic lower urinary dysfunction (NLUD), which is frequently seen in PD, has an effect on the development of anxiety and depression in these patients.*

*Materials and methods: The study included 32 males (66.6%) and 16 females (33.3%); in total 48 subjects were registered. For the diagnosis and severity of PD, the UK Parkinson's Disease Society Brain Bank Criteria, Unified Parkinson's Disease Rating Scale (UPDRS) and the Hoehn-Yahr scale were used. Urological evaluation was performed using history, physical examination, laboratory tests and standard forms such as IPSS and OAB-V8.*

*Results: There was no difference between the genders in terms of duration, severity and NLUD ( $p > 0.05$ ). The incidence of anxiety and depression in PD patients was 62.8% and 72.1%, respectively. The prevalence of NLUD was 67.4% and depression and anxiety was found to increase (1.06 and 1.28 times, respectively) in relation to NLUD. In particular, there was a relationship between storage lower urinary tract symptoms and anxiety and depression development ( $p < 0.05$ ).*

*Conclusions: As expected, it was found that the incidence of NLUD, anxiety and depression was increased in PD. In addition, NLUD was found to be a risk factor for the development of anxiety and depression. Therefore, it is concluded that NLUD, which can potentially cause important complications, as well as motor complaints, should be closely monitored and treated in PD patients.*

**KEY WORDS:** Bladder Dysfunction; Anxiety; Depression; Parkinson's disease.

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## INTRODUCTION

Idiopathic Parkinson's disease (PD) is a common movement disorder characterized by damage to dopaminergic neurons in the substantia nigra. It is the second most common neurodegenerative disease after Alzheimer's disease (1). Although the most prominent symptoms of PD are

motor disorders such as muscle rigidity, bradykinesia, tremor, many nonmotor symptoms (NMS) may occur in these patients such as sleep disturbances, anxiety, depression, sexual and urinary complaints (2, 3). NMSs are known to be associated with deterioration of quality of life or the development of major complications such as head trauma and hip fractures.

Neurogenic lower urinary dysfunction (NLUD) is a common disorder in PD patients that seriously affects the patient's daily work (4). In particular, frequent urination, urgency, and incontinence seriously affect the quality of life. It could lead the patient to stay home to get close to the toilet and away from people.

It is known that psychiatric problems such as anxiety and depression are more common in Parkinson's patients than their healthy peers. The exact cause of psychiatric problems is not known. However, refusal of treatment, deterioration of quality of life, and suicidal thinking can lead to important problems. In our opinion, NLUD, which causes significant problems even in healthy people, may be a cause for the development of anxiety and depression in Parkinson's patients. The aim of this study was to investigate whether there is a relationship between NLUD and psychological problems such as anxiety and depression in PD.

## MATERIALS AND METHODS

This study was planned jointly by the neurology and urology clinics of Ordu University Medical Faculty.

The files of the patients who were admitted to the movement disorder clinic between 2017 and 2019 with the diagnosis of PD and underwent urological evaluation were evaluated retrospectively. 48 patients who met the study criteria were enrolled in the study. For the diagnosis and severity of Parkinson's disease, the UK Parkinson's Disease Society Brain Bank Criteria, the Unified Parkinson's Disease Rating Scale (UPDRS) and Hoehn-Yahr scale (H&Y) were used (5, 6).

Secondary parkinsonism, psychiatric disease or drug use, history of pelvic radiotherapy or prostate, bladder and gynecological surgery, urinary tract infection, drug use related to prostate or bladder in the last 3 months,

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patients who could not fill in the questionnaire forms by themselves or with the help of their relatives were excluded.

Depression and anxiety levels of the patients were determined by *Hamilton Depression* (HAMD) and *Hamilton Anxiety* (HAMA) scales. The HAMD scale consists of 17 questions and the total score is obtained by adding the scores given to each question. The severity of depression is classified according to the total score (0-7 normal, 8-16 moderate depression, > 17 major). The HAMA scale consists of 14 questions and the total score is obtained by adding scores (0-5 points normal, 6-14 medium, > 14 major) (7).

Urological evaluation of the patients was performed by a specialist in this field with history, physical examination and necessary laboratory studies. Urinary complaints of the patients were evaluated using standard questionnaires such as IPSS (*International Prostate Symptom Score*) and OAB-V8 (*overactive bladder-V8*). IPSS is an internationally approved form used to describe the patient's lower urinary tract complaints over the past month. The IPSS form evaluates the patient's *quality of life* (QoL) as well as complaints related to storage and voiding. This form consists of 8 questions, 7 related to urinary system complaints and one related to QoL. Each question is given a score between 0-5. The total IPSS score in the range of 0-35 is obtained by summing the answers to 7 questions. According to the total IPSS score, LUTS complaints are classified as mild (0-7), moderate (8-19), and severe (20-35) (8).

The internationally accepted OAB-V8 form was used for storage lower urinary tract symptoms. The presence of at least one of the symptoms such as frequent urination, difficulty in urination, urgency and urinary incontinence associated with urgency was considered as OAB. This form consists of 8 questions and each question is given a score between 0-5, the total score is obtained by adding these points (9). The study received permission from the local ethics committee (Number: 2020/118).

### Statistical analysis

Statistical analyses were performed using commercial software (*Excel Statistics Ver. 20.0*). Student-T test was used to compare mean values. The effect of urinary symptoms on anxiety and depression scores was evaluated using binary logistic regression test. The relationship between anxiety and depression scores and QoL and IPSS total scores was evaluated by simple regression and correlation analysis. The p value of < 0.05 was used for statistical significance.

## RESULTS

A total of 48 subjects 32 men (66.6%) and 16 women (33.3%) were enrolled in the study. Mean age ( $\pm$  std) was  $69.84 \pm 7.47$ , mean age by gender was  $69.22 \pm 7.53$  and  $71.64 \pm 7.13$  years for men and women, respectively (not significant difference,  $p = 0.36$ ). The distribution of disease duration by gender was  $5.29 \pm 3.76$  years for males and  $5.64 \pm 3.13$  years for females ( $p = 0.78$ ). The distribution of UPDRS total score by gender was  $25.77 \pm 15.26$  for men and  $26.10 \pm 9.32$  for women ( $p = 0.95$ ) (Table 1). There was no difference between the groups in

**Table 1.**  
Demographic distribution of patients.

Parameters		Mean	Std. dev.	P-value
Average age	Men	69.22	7.53	0.36
	Women	71.64	7.13	
Disease duration	Men	5.29	3.76	0.78
	Women	5.64	3.13	
Age of onset of disease	Men	63.84	8.85	0.47
	Women	66	7.62	
UPDR total	Men	25.77	15.26	0.95
	Women	26.10	9.32	

terms of disease stage ( $p < 0.05$ ). HAMD and HAMA mean scores were;  $22.95 \pm 9.79$  (1-42) and  $8.51 \pm 5.12$  (1-22) respectively.

The prevalence of anxiety and depression in patients with Parkinson's disease was 62.8% and 72.1%, respectively. The overall mean score of OAB-V8 and IPSS was  $12.60 \pm 7.18$  (3-26) and  $9.58 \pm 6.08$  (1-25), respectively. The distribution of HAMA, HAMD, OAB-V8, IPSS and QoL scores by gender is shown in Table 2.

Urinary complaints were present in 67.4% of patients in general and in 68.4% of males and 63.6% of females ( $p = 0.75$ ). Storage lower urinary tract symptoms were found in 61% in general, 62.8% in males and 54.5% in females, respectively ( $p = 0.72$ ). The prevalence of nocturia was 62.8% in general, 63.5% in women and 62.5% in men ( $p = 0.94$ ). 83% of the patients had never been evaluated or questioned in terms of urinary complaints before.

In general, urinary complaints were correlated with anxiety and depression scores ( $p < 0.05$  for both). The risk of depression and anxiety increased with the presence of urinary complaints (1.06 and 1.28 times, respectively). In subgroup analyses, especially storage lower urinary tract symptoms were associated with anxiety and depression scores ( $p = 0.04$ ). This complaint increased the anxiety and depression scores by 1.05 and 1.07 times, respectively. The prevalence of nocturia was 62.8%. Nocturia was found to be associated with both anxiety and depression ( $p < 0.05$ ). Nocturia increased the risk of anxiety by 1.19 times (Table 3). IPSS total score was correlated with depression and anxiety ( $p = 0.03$  and  $p = 0.005$ , respectively).

**Table 2.**  
Scores of validated questionnaires of asses depression, anxiety and lower urinary tract symptoms.

Parameters		Mean	Std. dev.	P-value
Hamilton anxiety score	Men	7.5	4.42	0,06
	Women	10.72	5.44	
Hamilton depression score	Men	22.15	1036	0,42
	Women	25.10	8.14	
IPSS total score	Men	9.78	6.24	0,717
	Women	9	5.76	
Q-life skor	Men	2.41	1.60	0,46
	Women	2	1.54	
OAB	Men	11.94	7.02	0.61
	Women	13.45	8.75	

**Table 3.**  
Changes in anxiety and depression scores with bladder complaints.

Parameters		Mean	Std. dev.	P-value	Mean	Std. dev.	P-value
General urinary complaints	No	4.55	2.50	0.01	16.11	9.41	0.01
	Yes	9.50	5.25		25.18	8.93	
Storage	No	6.73	5.67	0.04	18.64	10.41	0.04
	Yes	10.41	4.96		25.43	8.95	
Nocturia	No	4.69	3.06	<0.001	18.25	10.83	0.01
	Yes	10.42	4.90		25.20	8.58	
Incontinence	No	7.33	4.85	0.02	22.73	9.45	0.84
	Yes	11.16	4.91		23.45	11.03	

Total IPSS score increased the risk of depression and anxiety 1.1 fold. There was a relationship between *quality of life score* (QoL) and depression and anxiety ( $p = 0.03$  and  $p = 0.03$ ), which increased the risk of anxiety and depression (0.9 and 1.5 times), respectively.

## DISCUSSION

Parkinson's disease is a multi-systemic disease which is associated with autonomic dysfunction (especially gastrointestinal problems such as constipation and sexual problems such as urinary and erectile dysfunction), anxiety, depression, sleep disturbance as well as motor complaints. The risk of developing at least one NMS in these patients is close to 100% (10). In our patients, urologic problems, such as urinary complaints, and psychiatric disorders, such as anxiety and depression, were commonly observed.

During daily practice, most PD patients are monitored only for motor complaints and they receive treatment in this regard. In other words, urinary problems are neglected. Our study results support this view. Most of our patients (83%) had never been evaluated for NLUD before. Patients considered NLUD as the natural consequence of this disease. The results of the study conducted by Gallagher and colleagues also support our conclusions. In this study, NMS incidence and their treatment rates in PD patients were examined. As a result of the study, it was found that one patient had an average of 11 NMS and only 5 of them received treatment (11). Consequently, it was shown that problems other than motor symptoms are frequently neglected in PD patients. Studies have shown that NLUD is a more common non-motor disorder in PD patients than in the control group (12). The reason for this is not known exactly. Rate of NLUD has been reported in the range of 38-71% in the literature (13). In our study, the incidence of NLUD was 67.4%. OAB which is composed of storage lower urinary tract symptoms such as frequent urination, urgency and incontinence is the most common disorder in this patient group. Uchiyama *et al.* reported the incidence of OAB as 64% (14). In our study, this rate was 61%. Dopaminergic system and autonomic nerve dysfunction in the substantia nigra which is disrupted in PD may be the cause of this pathology (15).

When PD deteriorates, the quality of life is affected due to PD because the patient becomes dependent on other people but also because suffers from urinary dysfunction.

Problems are amplified by a domino effect. For example, nocturia, urgency and fear of urinary incontinence can cause significant problems in the patient's daily life. The daily activities of the patients must be planned in a way that the patient is always close to an accessible toilet and nocturia can cause insomnia and dizziness and in the elderly the risk of falling at night. Thus, the patients start to have problems such as staying at home, loneliness, anger, anxiety, frustration and deterioration of social relations. Consequently the quality of life is severely impaired (16, 17). This negative environment may facilitate the development or aggravation

of psychiatric problems such as anxiety and depression.

In a study on this topic, Starkstein *et al.* examined the relationship between autonomic symptoms and the development of depression. The authors reported that the presence of 3 or more autonomic symptoms is a strong predictor of depression (18). For this reason, the *American Academy of Neurology* recommends regular monitoring of NMS in adjunct to motor complaints (19).

It is known that psychiatric problems such as anxiety and depression in PD are more common (7-80%) than the general population and other chronic neurological diseases such as multiple sclerosis. The exact cause of anxiety and depression in these patients is unknown. It may occur as a part of the neurodegenerative process of PD. NLUD, which seriously deteriorates the quality of life, even in normal people, can trigger or worsen psychiatric problems in these patients.

According to the result of our study, anxiety and depression rates were 76% and 83%, respectively. In addition, there was a relationship between NLUD and anxiety and depression development. These results were consistent with the literature. In a study on this topic, Engström *et al.* examined the relationship between NLUD and sadness and joy. The Authors reported that patients with urinary complaints felt unhappy and sad about twice as much as the control group (20). In another study, Irwin *et al.* examined the relationship between bladder dysfunction and work life, social environment, and emotional well-being. At the end of the study, they reported that NLUD has an effect on social intercourse, productivity in business life and feeling good (21). In another study, Brittan *et al.* examined the relationship between post-stroke depression and bladder complaints. At the end of the study, they reported that urinary complaints increased the risk of depression twice (15% vs. 30%). The Authors suggested that NLUD should be taken seriously in these patients because of the close relationship between depression and suicide (22). In another study, Melvilla *et al.* reported that the risk of developing depression in women with storage lower urinary tract symptoms increased by 3-4 times (23). In our study, QoL was assessed with a question in the IPSS questionnaire. There was a correlation between QoL and anxiety and depression scores. This result is also important for creating a vicious circle. Deteriorating quality of life triggers psychological problems and psychological problems can lead to more deterioration of quality of life. In one study, the relationship between depression and QoL was investigated.

The researchers reported that 83% of depression predicted impaired QoL (24).

In another study by Schwarz *et al.*, the relationship between anxiety and depression and HRQoL (health-related quality of life) was examined. In this study, anxiety and depression were reported as the most important risk factors adversely affecting HRQoL (25). When the results of the above study are examined in general, there is an inverse interaction between quality of life and depression and anxiety. Therefore, especially in this age group, because of the close relationship between depression and suicide, the causes of depression in PD patients should be investigated and treated. As seen in the results of our study, NLUD appears to be an important risk factor for the development of anxiety and depression.

In our study, rate of nocturia was found to be 62.8%, and it was also identified as a risk factor for the development of anxiety and depression. Sleep disorders may be the basis of the relationship between nocturia and anxiety and depression.

In other studies, it was found that sleep disorder frequently develops in PD (19). Going to the toilet frequently at night results in a sleep break that may manifest itself with fatigue, dizziness, exhaustion, irritability, and depressive mood. Insomnia, which causes significant problems even in normal individuals, can have more serious consequences in PD patients. For this reason, nocturia in these patients should be noticed in a timely manner and necessary precautions should be taken.

Our study has some limitations. The most important of these is the low number of patients and the retrospective design of the study. In addition, other causes of anxiety and depression were not searched in this study. However, we think that this study is one of the few studies examining the relationship between bladder dysfunction and the development of anxiety and depression in PD.

## CONCLUSIONS

In conclusion, NMS such as neurogenic lower urinary dysfunction, anxiety and depression are common in PD patients. However, in daily practice, clinicians who treat these patients often neglect these symptoms because they are more concerned with motor complaints. According to the results of our study, NLUD is a risk factor for the development of anxiety and depression.

These patients, whose quality of life is already deteriorated due to PD, should not be exposed to problems related to NLUD (such as falling, head trauma due to falls, hip fractures, insomnia, anxiety and depression) and the necessary precautions should be followed closely. Patients should not be expected to discuss these complaints, because, as we have seen in our study, these complaints can sometimes be forgotten or considered by patients as a natural part of the disease.

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