Original Article

Prevalence and Risk Factors for Anxiety and Depression in Thai People with Parkinson's Disease: A Cross-Sectional Study in Buriram Hospital

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Background: Anxiety and depression are non-motor symptoms commonly found in patients with Parkinson's disease (PD).

Objective: To investigate the prevalence of anxiety and depression in patients with PD, including factors related to their anxiety and depression.

Materials and Methods: Forty-four PD patients of the present cross-sectional study were observed between August 1, 2021 and September 30, 2021. Anxiety and depression were assessed using the hospital anxiety and depression scale (HADS). A score of 8 or more on both HADS anxiety subscale (HADS-A) and HADS depression subscale (HADS-D) denoted significant symptoms of anxiety and depression among the PD patients. Descriptive statistics were used to analyze the prevalence and demographic data. The authors used binary logistic regression, linear regression, and Spearman's rank correlation coefficient to analyze the factors associated with anxiety and depression.

Results: From the 44 Thai PD patients, the prevalence of anxiety and depression were 27.3% and 31.8%, respectively. The anxiety related factors were PD duration of 10 years or more (OR 7.50, 95% CI 1.16 to 48.56), levodopa equivalent dose (LED) of 600 mg/day or more (OR 7.00, 95% CI 1.50 to 32.72), total Unified Parkinson's Disease Rating Scale (UPDRS) (β=0.46, 95% CI 0.18 to 0.74), UPDRS part II (β=0.32, 95% CI 0.02 to 0.61), and UPDRS III (β=0.37, 95% CI 0.08 to 0.66). The depression related factors were total UPDRS (β=0.39, 95% CI 0.11 to 0.68), and UPDRS part II (β=0.33, 95% CI 0.03 to 0.62).

Conclusion: Results indicate that anxiety and depression are associated with disease severity among individuals with PD. Therefore, physicians who treat PD patients with high disease severity should be aware of and screen for these emotional problems to facilitate appropriate management.

Keywords: Anxiety; Depression; Disease severity; Functional performance test; Hospital anxiety and depression scale; Parkinson's disease

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Parkinson's disease (PD) is the second most common neurodegenerative disease after Alzheimer's disease. PD symptoms include motor symptoms such as bradykinesia, cogwheel rigidity, postural instability, and resting tremor, and non-motor such as anxiety and depression. Previous systematic review studies found that the prevalence of anxiety and depression in individuals with PD were 31.0% and 22.9%, respectively[1,2]. These symptoms may lead to a deteriorating quality of life[3] and suicidal ideation, which can be as high as 14.4%[4]. Hence, PD management and follow-up should emphasize recognizing and relieving these symptoms.

Studies found factors related to anxiety and depression in individuals with PD. Factors associated with anxiety in individuals with PD[5-8] include gender, sleep disorder, autonomic dysfunction, memory impairment, smoking, low education, depression, age of onset, staging of the disease, and disease duration and severity. Those associated with depression[5,9-12] include gender, sleep disorder, autonomic dysfunction, memory impairment, marital status, anxiety, levodopa equivalent dose (LED), and disease duration and severity. However, findings were

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inconclusive. For example, the study by Cui et al[5] found that PD duration was associated with anxiety. However, the study by Dissanayaka et al[8] showed no such association. Moreover, only one study[13] has investigated the relationship between the results of functional performance tests and depression in patients with PD.

The objectives of the present study were to investigate the prevalence of anxiety and depression in patients with PD, including factors related to these symptoms.

Materials and Methods

The present study was approved by the Ethics Committee of Buriram Hospital (IRB: BR0032.102.1/38) and conducted in accordance with the Helsinki Declaration.

Patients

The present study was a cross-sectional study, observing patients with PD treated at the Neurology Outpatient Clinic, Buriram Hospital, between August 1 and September 30, 2021. The inclusion criteria were older than 40 years, diagnosed with idiopathic Parkinson's disease using the United Kingdom Parkinson's Disease Society Brain Bank diagnostic criteria, and could walk at least 10 meters without assistance. The exclusion criteria were refused to participate, dementia, or previously diagnosed with anxiety or depressive disorders.

Data collection and measurements

The research teams explained the research procedures and processes to the patients. Those willing to participate in the present study signed informed consent forms.

All patients with PD were on-period medication during the data collection. A psychologist measured anxiety and depression. The authors used the hospital anxiety and depression scale (HADS), a reliable self-rating scale, to diagnose anxiety and depression[14,15].

Questionnaire

The HADS questionnaire comprised 14 items. The authors used odd items to summarize seven anxiety related items and items for the other seven related to depression. The score was defined as follows:

- PD patients with anxiety were denoted by a HADS anxiety subscale (HADS-A) score of 8 or more[16].
- PD patients with depression were denoted by a HADS depression subscale (HADS-D) score of 8 or more[16].

Factors related to anxiety and depression

The patients with PD were assessed in three areas, personal factors, clinical factors, and functional performance related to anxiety and depression.

- Personal factors included gender, age, occupation, marital status, education, and income.
- Clinical factors included body mass index, PD onset, PD duration, Hoehn and Yahr stage, LED, which was calculated using data from a previous study[17]. Disease severity was measured using the Unified Parkinson's Disease Rating Scale (UPDRS) that consisted of four parts:
  - Part I: Non-motor aspects of experiences of daily living
  - Part II: Motor aspects of experiences of daily living
  - Part III: Motor examination
  - Part IV: Motor complication

  A neurologist evaluated all clinical factors.
- Functional performance was assessed using gait speed, timed up and go, and five times sit-to-stand tests.
  - Gait speed[18] was assessed using the 10-meter walk test. Gait speed was calculated by measuring the time spent walking at a maximum speed for 10 m.
  - The timed up and go[19] was used to evaluate walking ability, balance, and mobility. Participants were instructed to sit in a chair with an armrest. When an assessor said "Go," the participants were to stand up, walk for three meters at the maximum safe speed, and return to sit in their chairs. Timing began on the "Go" signal and stopped when the participants were back in their chairs.
  - Five times sit-to-stand[20] was used to evaluate balance and lower extremity strength. Participants were instructed to sit in a chair and place their arms beside their bodies. When an outcome assessor said "Go," the participants were to stand up and thereafter sit back on the chair as quickly as possible. Timing began on the "Go," signal and stopped after the fifth time the participants sat back in their chairs with their backs against the seat backs.

  A sports scientist evaluated all functional performance tests.

Sample size

Depression usually leads to more serious events such as suicidal ideation and self-harming. Therefore, the sample size was calculated to address

Table 1. Characteristics of Thai people with Parkinson's disease

Characteristics	All (n=44)	Anxiety			Depression		
		HADS-A <8 (n=32)	HADS-A ≥8 (n=12)	p-value	HADS-D <8 (n=30)	HADS-D ≥8 (n=14)	p-value
Sex: male; n (%)	21 (47.7)	16 (50.0)	5 (41.7)	0.62	15 (50.0)	6 (42.9)	0.66
Age (years); mean [SD]	61.5 [9.0]	60.9 [9.1]	62.8 [8.7]	0.54	62.0 [9.5]	60.2 [7.6]	0.53
Unemployed; n (%)	23 (52.3)	14 (43.8)	9 (75.0)	0.07	15 (50.0)	8 (57.1)	0.66
Not having a partner; n (%)	11 (25.0)	7 (21.9)	4 (33.3)	0.43	7 (23.3)	4 (28.6)	0.71
Schooling year <6; n (%)	35 (79.5)	24 (75.0)	11 (91.7)	0.22	25 (83.3)	10 (71.4)	0.36
Income <3,000 THB/month; n (%)	29 (65.9)	18 (56.3)	11 (91.7)	0.03*	18 (60.0)	11 (78.6)	0.23
BMI (kg/m^2); mean [SD]	22.7 [3.1]	22.8 [2.7]	22.6 [4.2]	0.90	22.2 [2.9]	23.7 [3.4]	0.15
PD onset (years); mean [SD]	56.8 [8.5]	57.0 [8.4]	56.0 [9.0]	0.75	57.2 [8.8]	55.8 [7.8]	0.60
PD duration (years); mean [SD]	4.7 [4.1]	3.9 [3.0]	6.8 [5.9]	0.13	4.8 [3.8]	4.4 [7.8]	0.79
Hoehn and Yahr stage; n (%)				0.26			0.78
1	10 (22.7)	7 (21.9)	3 (25.0)		7 (23.3)	3 (21.4)	
2	18 (40.9)	15 (46.9)	3 (25.0)		13 (43.3)	5 (35.7)	
3	15 (34.1)	10 (31.3)	5 (41.7)		9 (30.0)	6 (42.9)	
4	1 (2.3)	0 (0.0)	1 (8.3)		1 (3.3)	0 (0.0)	
LED (mg/day); mean [SD]	373.0 [254.8]	320.3 [244.8]	513.3 [235.1]	0.02*	358.8 [265.4]	403.2 [236.9]	0.60
Total UPDRS (points); mean [SD]	62.6 [29.8]	56.3 [28.7]	79.3 [27.0]	0.02*	58.5 [32.2]	71.4 [22.4]	0.18
UPDRS I (points); mean [SD]	11.6 [7.6]	9.5 [6.3]	17.1 [8.2]	0.01*	9.1 [6.4]	16.9 [7.3]	0.01*
UPDRS II (points); mean [SD]	11.8 [6.8]	10.4 [6.9]	15.3 [5.2]	0.03*	10.7 [6.9]	14.1 [6.1]	0.12
UPDRS III (points); mean [SD]	36.3 [18.4]	33.9 [16.7]	42.6 [19.7]	0.17	35.6 [19.7]	37.6 [15.8]	0.74
UPDRS IV (points); mean [SD]	4.0 [4.8]	3.5 [4.0]	5.2 [6.5]	0.31	4.1 [4.9]	3.6 [4.7]	0.77
Gait speed (m/second); mean [SD]	1.2 [0.3]	1.2 [0.2]	1.1 [0.2]	0.14	1.2 [0.3]	1.1 [0.2]	0.74
5 times sit to stand (seconds); mean [SD]	13.3 [4.6]	13.3 [5.3]	13.3 [2.3]	0.99	13.8 [5.5]	12.3 [1.4]	0.31
Time up and go (seconds); mean [SD]	14.0 [5.1]	13.9 [5.5]	14.3 [3.9]	0.81	14.3 [5.7]	13.3 [3.2]	0.57

BMI=body mass index; PD=Parkinson's disease; LED=levodopa equivalent dose; UPDRS=unified Parkinson's disease rating scale; HADS-A=hospital anxiety and depression scale part anxiety; HADS-D=hospital anxiety and depression scale part depression; SD=standard deviation

* p<0.05, statistical significance

the research question on the prevalence of depression in individuals with PD. This calculation was based on the estimation of a finite population proportion. The data from the outpatient department showed that 40 patients with PD were treated at the Neurology Clinic, Buriram Hospital, in two months. Cui et al[5] showed that the prevalence of depression in patients with PD was 11.2%. The sample size was set at 43 to overcome dropouts from the study.

Statistical analysis

The authors used IBM SPSS Statistics, version 19 (IBM Corp., Armonk, NY, USA) to conduct data analyses. Descriptive statistics, including amount, percentage, average, and standard deviation (SD), were used to analyze the prevalence and general data of the participants. The independent paired t-test and chi-square test were used to compare the differences between the participant groups. To analyze the factors related to anxiety and depression, the authors used binary logistic regression for categorical variables as well as linear regression and Spearman's rank correlation coefficient for continuous variables. The statistical significance was set at 0.05.

Results

Forty-four patients were enrolled in the present study with 21 males (47.7%) and 23 (52.3%) females, with mean age (SD) of 61.5 (9) years. The personal and clinical factors, and functional performance test results are shown in Table 1. The prevalence of anxiety and depression were 27.3% (12 of 44 patients) and 31.8% (14 of 44 patients), respectively, and nine patients (20.5%) had both anxiety and depression.

The relationship between anxiety, depression, and categorical variables after binary logistic regression analysis is shown in Table 2. The factors related to anxiety at HADS-A of 8 or more, included PD duration of 10 years or longer (OR 7.50, 95% CI 1.16 to 48.56), and LED of 600 mg/day or more (OR

Table 2. Relationship between anxiety or depression and clinical characteristic in Parkinson's disease, analyzed by binary logistic regression

Variables	HADS-A ≥8		HADS-D ≥8	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Female	1.40 (0.37 to 5.35)	0.62	1.33 (0.37 to 4.79)	0.66
Age ≥65 years	1.19 (0.31 to 4.60)	0.80	0.31 (0.07 to 1.35)	0.12
Unemployed	3.86 (0.88 to 16.97)	0.07	1.33 (0.37 to 4.79)	0.66
Not having a partner	1.31 (0.31 to 5.52)	0.71	1.79 (0.41 to 7.72)	0.44
Schooling year <6	3.67 (0.41 to 33.02)	0.25	0.50 (0.11 to 2.25)	0.37
Income <3,000 THB/month	8.56 (0.98 to 74.41)	0.05	2.44 (0.56 to 10.64)	0.23
BMI ≥25 kg/m^2	1.08 (0.18 to 6.49)	0.93	0.83 (0.14 to 4.93)	0.84
PD onset <45 years	6.20 (0.51 to 75.84)	0.15	4.83 (0.40 to 58.47)	0.22
PD duration ≥10 years	7.50 (1.16 to 48.56)	0.04*	1.08 (0.17 to 6.75)	0.93
Hoehn and Yahr stage 3-4	2.20 (0.57 to 8.54)	0.26	1.50 (0.41 to 5.52)	0.54
LED ≥600 mg/day	7.00 (1.50 to 32.72)	0.01*	1.60 (0.37 to 6.92)	0.53

BMI=body mass index; PD=Parkinson's disease; LED=levodopa equivalent dose; HADS-A=hospital anxiety and depression scale part anxiety; HADS-D= hospital anxiety and depression scale part depression; OR=odds ratio; CI=confidence interval

* p<0.05, statistical significance

Table 3. Parkinson's disease factors associated with depression and anxiety, analyzed by linear regression analysis

Variables	HADS-A			HADS-D		
	β	95% CI of β	p-value	β	95% CI of β	p-value
Total UPDRS	0.46	0.18 to 0.74	0.002*	0.39	0.11 to 0.68	0.008*
UPDRS II	0.32	0.02 to 0.61	0.04*	0.33	0.03 to 0.62	0.03*
UPDRS III	0.37	0.08 to 0.66	0.01*	0.26	–0.04 to 0.57	0.08
UPDRS IV	0.16	–0.15 to 0.47	0.30	0.09	–0.23 to 0.40	0.58
Gait speed	–0.22	–0.52 to 0.09	0.16	–0.13	–0.44 to 0.18	0.40
5 times sit to stand	0.02	–0.29 to 0.33	0.88	0.01	–0.30 to 0.33	0.93
Time up and go	0.10	–0.21 to 0.41	0.51	–0.001	–0.31 to 0.31	1.00

UPDRS=unified Parkinson's disease rating scale; HADS-A=hospital anxiety and depression scale part anxiety; HADS-D=hospital anxiety and depression scale part depression; CI=confidence interval

* p<0.05, statistical significance

7.00, 95% CI 1.50 to 32.72).

The relationship among anxiety, depression, and continuous variables, determined using linear regression analysis and Spearman's rank correlation coefficient, is shown in Table 3, and Figure 1 and 2. The factors related to anxiety included total UPDRS (β=0.46, 95% CI 0.18 to 0.74), UPDRS part II (β=0.32, 95% CI 0.02 to 0.61), and UPDRS part III (β=0.37, 95% CI 0.08 to 0.66); factors related to depression included total UPDRS (β=0.39, 95% CI 0.11 to 0.68) and UPDRS part II (β=0.33, 95% CI 0.03 to 0.62).

Discussion

The prevalence of anxiety and depression in patients with PD in the present study were 27.3% and 31.8%, respectively. These findings were similar to previous systematic review studies[1,2]. However, the present results were less than that of a previous study that used the same criteria and cut-off points and found that the prevalence of anxiety and depression were 51% and 41%, respectively[21]. This might be explained by the disease duration, which was shorter in the present study at 4.7 versus 5.4 years. However, the prevalence of anxiety and depression among Thai people with PD were higher than that in an age-matched healthy population with 9.6% and 11.8% for anxiety and depression, respectively[21]. Therefore, the prevalence of emotional problems in patients with PD in the present study was three times higher than that in a healthy population. These data support the relationship between PD and anxiety and depression.

The present study has also investigated factors related to anxiety and depression in patients with PD.

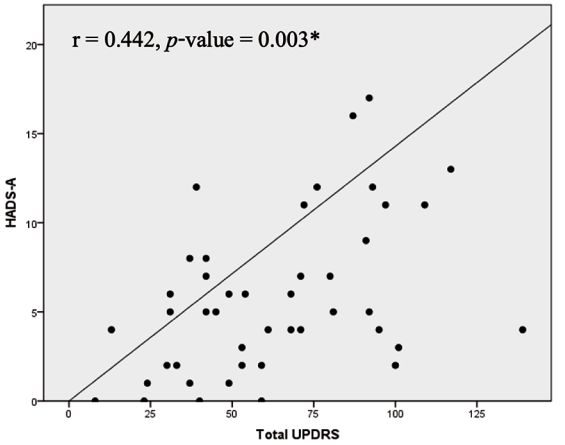

Figure 1. Scatter plot of total UPDRS vs. HADS-A for patients with PD (r was calculated by using Spearman's rank correlation coefficient).

UPDRS=unified Parkinson's disease rating scale; HADS-A=hospital anxiety and depression scale part anxiety; PD=Parkinson's disease

* p<0.05

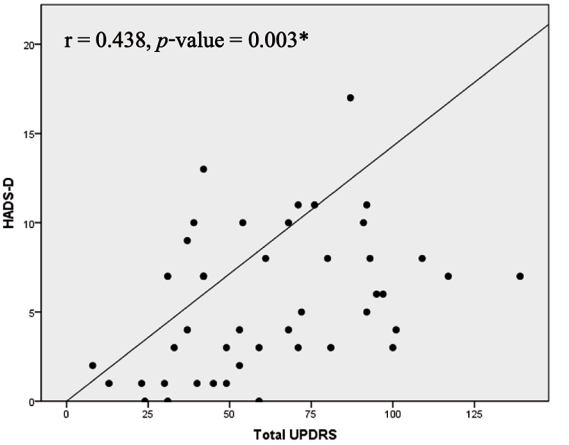

Figure 2. Scatter plot of total UPDRS vs. HADS-D for patients with PD (r was calculated by using Spearman's rank correlation coefficient).

UPDRS=unified Parkinson's disease rating scale; HADS-D=hospital anxiety and depression scale part depression; PD=Parkinson's disease

* p<0.05

The assessment was divided into three parts.

The first part addressed personal factors. There were no statistically significant personal factors related to anxiety and depression in patients with PD. However, having an income of less than 3,000 THB per month tended to correlate to PD with anxiety (OR 8.56, 95% CI 0.98 to 74.41). This can be inferred from Table 1, which shows that 91.7% of PD patients with anxiety received an income of less than 3,000 THB per month, whereas only 56.3% of those without anxiety received an income of less than 3,000 THB per month (p=0.03). This finding supports a previous study in a healthy population[22]. The authors postulated that financial strain might also cause other problems such as those related to family relationships and increased stress at the workplace, which might lead to anxiety. Moreover, anxiety might lead to a low quality of life[3], and further reduce the ability to earn a living.

The second part addressed clinical factors. The authors found that clinical factors related to anxiety included PD duration of 10 years or longer, LED of 600 mg/day or more, and total UPDRS, UPDRS parts II, and III. Factors related to depression included total UPDRS and UPDRS part II. These data show that disease severity had a strong relationship with anxiety and depression. The authors posit that the severity of PD is related to anxiety and depression. In other words, when the disease is more severe, there is more dopaminergic neuron loss, which subsequently leads to emotional problems. An animal study that found the reduction of dopaminergic transmission in the basal ganglion resulted in increased anxiety in experimental mice[23]. Similarly, a human study also found that a loss of dopaminergic and noradrenaline innervation was associated with anxiety and depression in PD[24].

The third part addressed functional performance test results. The present study did not find any factors related to anxiety and depression in individuals with PD. These findings contrasted with the previous studies that showed a relationship between gait speed and anxiety and depression[13,25]. However, the functional performance test results should be related to these emotional problems. This relationship may be more evident if the sample size was increased in future studies.

Limitation

The present study had limitations. First, a psychiatrist, neurologist, and sport scientist gathered the data. Some of data collection methods were an interview and questionnaire. Therefore, bias and error might have occurred. Second, since the present study was a small cross-sectional study, the authors could neither define the causation of each factor nor demonstrate lifetime occurrence of anxiety and depression in individuals with PD. Third, certain associated factors of anxiety and depression, such as loss of a relative or the effect of the COVID-19 pandemic, were not measured.

Conclusion

The prevalence of anxiety and depression

in patients with PD was 27.27% and 31.81%, respectively. Factors related to anxiety in PD included PD duration, LED, total UPDRS, UPDRS part II, and UPDRS part III. Factors related to depression included total UPDRS and UPDRS part II.

What is already known on this topic?

Anxiety and depression are non-motor symptoms frequently found in PD patients. There are limited studies that investigate the prevalence and factors associated with anxiety and depression in Thai people with PD and some of them are controversial.

What this study adds?

This is the first study in Thailand that investigated factors associated with anxiety and depression in PD patients. The results of the study indicate a relationship between anxiety and depression and disease severity in patients with PD.

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Conflicts of interest

The authors declare no conflict of interest.

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