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ORIGINAL RESEARCH

Suicidal behavior among Turkish patients with Parkinson's disease

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Objective: To investigate the predictors of suicidal ideation and attempts among Turkish Parkinson's disease (PD) patients.

Materials and methods: The study comprised 120 patients with PD. Clinical findings were obtained by using the Unified Parkinson's Disease Rating Scale. Disease severity was measured by the Hoehn and Yahr staging scale, and the Schwab and England Activities of Daily Living scale was used for patient disability. Psychiatric evaluation was performed by the same psychiatrist using the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) Axis I Disorders. Severity of depression was measured with the Hamilton Depression Rating Scale. Suicidal ideation and attempts were considered positive if experienced during the patient's lifetime. The Suicide Probability Scale was used to assess the risk of suicide. Data were analyzed by logistic regression models to identify variables associated with suicidal ideation and attempts.

Results: Based on logistic regression analysis, education level, age of disease onset, disease duration, depression, and history of impulse-control disorder (ICD) behaviors were significant predictors of suicidal ideation. The risk rate in the presence of depression and history of ICD behaviors was increased by 5.92 and 4.97, respectively. Additionally, lifetime prevalence of suicidal ideation was found in 11.6% (14 of 120) of PD patients, although no patient had ever attempted suicide.

Conclusion: Turkish patients with PD who exhibit a high risk for suicidal ideation also experience disease starting at an earlier age, longer disease duration, presence of depression, and ICD behaviors, and should be monitored carefully.

Keywords: Parkinson's disease, suicidal behavior, risk factors

Introduction

Suicide-related behaviors and thoughts may be categorized as suicidal ideation, suicide attempts, and completed suicide, the former two being among the most important risk factors for completed suicides.[1,2] Suicidal ideation is defined as thoughts about intentionally ending one's own life, but not taking action. Attempted suicide is self-injury with the desire to end one's life that does not result in death.[3] Suicide is a complex entity, involving biological, genetic, and environmental risk factors. Predictors and risk factors of suicidal behavior include a history of previous suicide attempts, certain demographic variables, clinical symptoms, and issues related to medical and social support.[4]

Parkinson's disease (PD) is a progressive neurodegenerative and neuropsychiatric disorder. It was initially known primarily as a motor disorder, with tremor, bradykinesia,

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rigidity, and postural instability as dominant features. In addition, nonmotor psychiatric symptoms often arise during the course of this chronic disease.[5] Depression is the most prevalent psychiatric disorder.[6] As a result of disability in the motor system, depression, and other psychiatric disorders along with the neuropathology of PD, these patients could be at a higher risk for suicide.

Suicide-related behaviors may be more common in some neurological diseases, such as Huntington's disease, multiple sclerosis, and traumatic spinal cord lesions.[7] However, few studies have investigated the risk of suicide in PD, and even fewer have investigated this in developing Islamic countries, such as Turkey.[2,3,8–11]

In the present study, we investigated the prevalence of suicidal ideation and attempts and possible related demographic and clinical risk factors in nondemented, Turkish PD patients, and also took into account suicidal ideation.

Materials and methods

A total of 120 eligible, consecutive patients attending an outpatient clinic and diagnosed with PD by a single movement-disorder specialist were enrolled over a 6-month period. No subject had undergone surgical treatment for PD. Patient demographic data included age, sex, religion, years of education, marital status and number of children, employment, disease duration, treatment duration, complications of levodopa therapy, history of depression, history of current or previous antidepressant treatment, history of any behaviors related to impulse-control disorder (ICD) during the course of PD, family history of depression or other mental disorders, family history of suicide, and history of heavy alcohol use (>14 drinks weekly). All subjects were Muslim.

Patients underwent a complete neurological examination in their "on" phase, which included all sections of the Unified Parkinson's Disease Rating Scale (UPDRS),[12] Hoehn and Yahr (HY) scale,[13] Schwab and England Activities of Daily Living Scale (SES),[14] Mini-Mental State Examination (MMSE),[15] and detailed neuropsychological testing.[16] The clinical type of PD onset was classified as tremor-dominant or bradykinesia-dominant; dyskinesia status, motor fluctuations, and postural instability were determined as present or absent. The UPDRS is a tool comprising four sections that assesses severity of nonmotor symptoms, impact on activities of daily living, motor signs, and disease complications and treatment. Complications include dyskinesia and motor fluctuations. The HY scale objectively evaluates PD stages, and the SES is used to assess disability in activities of daily living. All subjects were on various forms of dopaminergic treatment. The levo-dopa equivalent daily dose (LEDD)[17] was calculated, and the use of dopamine agonists was recorded. Patients diagnosed with dementia according to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM)-IV and neuropsychological testing, and those who had lower scores in the MMSE were excluded from the study.

Diagnosis of psychiatric disorders was made using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID),[18] administered to each patient by the same psychiatrist trained for the SCID interview. Severity of depression was measured with the Hamilton Depression Rating Scale (HDRS; 21 items).[19]

A question about suicidal ideation ("Have you ever seriously thought about suicide in your lifetime?") was administered to all subjects. Those who answered positively were subsequently asked about suicide attempts ("Have you ever attempted suicide in your lifetime?"). Positive responses were recorded, and then those subjects were tested against the Suicide Probability Scale (SPS),[20] a 36-item questionnaire specifically used to assess the risk of suicide. Atli et al adapted the SPS into Turkish in 2009.[21] This scale was used to measure current suicide ideation (six items), hopelessness (12 items), negative self-evaluation (nine items), and hostility (nine items). Questions about the frequency of emotions and behaviors were answered on a 4-point scale ranging from 1 ("None or a little of the time") to 4 ("Most or all of the time"). The total score ranged from 30 to 147, with a weighted score of 78 as the cutoff score for "high risk". All scales used for patients were developed through qualitative research and a validation study, in accordance with Turkish cultural and linguistic characteristics. The study was approved by the institutional review board, and all patients provided written informed consent.

Statistical analysis

All analyses were carried out using SPSS software version 15.0 (SPSS Inc., Chicago, IL, USA). Comparisons of categorical variables between groups were performed using Fisher's exact test and the χ^2 test. For continuous variables, Mann–Whitney U and Student's t-tests were carried out. For multivariate analyses, the possible factors identified by univariate analyses were further entered into a logistical regression analysis to determine independent predictors of suicidal ideation. Hosmer–Lemeshow goodness-of-fit statistics were used to assess model fit. Pearson's correlation coefficient was calculated to evaluate the relationship between SPS and education level, disease duration, and HDRS scores. In all analyses, $P<0.05$ was taken to indicate statistical significance.

Results

The mean age of the study population was 61.6±9.1 (range 40–75) years, and 65% were male. The mean duration of education was 8.0±3.6 years. Patients had mild-to-moderate disease severity, with an average duration of 7 years. No patients had a severe disability, and none were bedridden. Only 12 patients had a family history of PD. The mean MMSE score was 26.7, suggesting that patients had intact global cognition on average. The mean LEDD was 743±479 mg. Of the patients, 81% were using dopamine-agonist treatment. In our sample, no patient had a family history of suicide attempts, psychosis, and/or previous subthalamic stimulation. Table 1 shows the demographic and clinical characteristics of patients with and without suicidal ideation.

PD patients with or without suicidal ideation did not differ statistically in sex, age, or marital status (Table 1). Patients with suicidal ideation had lower education levels and earlier disease onset. Clinical variables, such as disease duration, SES, UPDRS (motor part) scores, dyskinesia, motor fluctuations, and LEDD were associated significantly with suicidal ideation (Table 1).

The estimated lifetime prevalence rate of suicidal ideation among PD patients was 11.6%, even though no patient had ever reported a suicide attempt. Univariate analysis of different factors showed that education level, disease duration, age of PD onset, presence of depression, and presence of ICD behaviors were significantly associated with the presence of suicidal ideation (Table 2). The risk rate of suicidal ideation in the presence of depression and history of ICD behaviors increased by 5.92 and 4.97, respectively.

The mean SPS score was significantly higher in patients with suicidal ideation, and these patients were based at high risk on the scale. There was a positive correlation between SPS and HDRS scores (Pearson's r=0.387, $P<0.05$), while there was no correlation between SPS and education level or disease duration (Table 3).

Table 1 Demographic and clinical features of Parkinson's disease (PD) patients with and without suicidal ideation

Variables	With suicidal ideation (n=14)	Without suicidal ideation (n=106)	*P*-values
Demographic			
Sex (male/female)	10/4	68/38	0.76
Age, years*	56.7±9.9	62.2±8.8	0.06
Education, years*	5.4±1.9	8.3±3.7	<0.001
Marital status, % married	10.2	18.2	0.28
PD-related			
Duration, years*	10.5±6.7	6.7±1.8	0.003
Age of PD onset, years*	46.2±6.8	55.3±9.5	<0.001
Hoehn and Yahr stage*	2.4±0.7	2.1±0.7	0.136
Schwab and England score*	74.2±13.4	81.4±9.9	0.018
UPDRS motor score*	33.4±5.7	21.3±4.8	0.003
UPDRS dyskinesia*	4.14±1.7	0.38±0.3	<0.001
UPDRS motor fluctuation score*	2.86±0.3	0.62±0.2	0.003
L-Dopa dosage, mg*	1284.29±373.8	672.4±363	0.015
Psychiatric			
HDRS score*	21.3±2.6	8.7±1.6	<0.001
Presence of depression (% yes)	14 (100)	29 (27.6)	<0.001
Positive history of ICD (% yes)	10 (71.4)	18 (17.0)	<0.001
Suicide Probability Scale score*	74.7±8.4	56±14.7	<0.001

Note: *Values presented as means ± standard deviation.
Abbreviations: UPDRS, Unified Parkinson's Disease Rating Scale; HDRS, Hamilton Depression Rating Scale; ICD, impulse-control disorder.

Discussion

Suicide is a major public health problem.[3] According to the National Comorbidity Survey, the estimated lifetime prevalence of suicidal ideation and attempts in the general population is 13.5% and 4.6%, respectively.[22] To the best of our knowledge, there is only one study that has investigated the prevalence of suicidal ideation in the general population in Turkey.[23] In that study, lifetime prevalence of suicidal ideation was 6.6%, based on face-to-face interviews of a sample of 1,086 people between 15 and 65 years of age in Manisa. No studies have yet been published in Turkey regarding suicidal ideation or attempts in patients with PD.

Table 2 Univariate logistic regression analysis for suicidal ideation (n=14)

Variable	Odds ratio	95% CI	*P*-value
Age	0.76	0.76–1.13	0.51
Sex	2.60	0.66–2.69	0.07
Education	1.25	1.85–3.09	0.01
Duration of PD	2.03	1.96–4.10	0.03
UPDRS motor score	1.01	0.97–1.05	0.75
Age at PD onset	2.17	0.91–2.03	0.04
Hoehn and Yahr stage	1.45	0.64–2.37	0.28
Schwab and England score	1.97	0.93–3.01	0.27
UPDRS total score	2.31	0.63–4.20	0.65
L-Dopa dosage, mg	1.96	1.17–6.14	0.03
Depression, HDRS	5.92	2.01–4.24	0.001
History of ICD	4.97	1.90–9.38	0.002

Abbreviations: CI, confidence interval; PD, Parkinson's disease; UPDRS, Unified Parkinson's Disease Rating Scale; HDRS, Hamilton Depression Rating Scale; ICD, impulse-control disorder.

Table 3 Correlations between years of education, disease duration, severity of depression, and Suicide Probability Scale scores

	Suicide Probability Scale scores	
	r	*P*
Education	0.020	0.827
Disease duration	–0.31	0.738
HDRS	0.38	0.002

Abbreviation: HDRS, Hamilton Depression Rating Scale.

In the present study, we found that 11.6% of patients with PD had suicidal ideation. The frequency of suicidal ideation in our PD sample seems to be lower than that of the general western population, but it does seem to be higher in the general Turkish population. Our findings are in accordance with previous PD studies. Nazem et al[3] reported that the rate of suicidal ideation in PD was 11.2%, Kostić et al[2] reported a rate of 10.2%, and Kummer et al[9] found a higher prevalence of suicidal ideation in PD (14.4%). Fortunately, our study did not include any patients who had ever attempted suicide. This finding is unusual, based on other studies demonstrating that the frequency of suicide attempts ranges from 1% to 6%.[3,10] Our results suggest that suicidal ideation is common in PD, although not clearly more so than in the elderly population in general, and that suicide attempts may actually be very rare or absent.

There have been studies on the prevalence, risk factors, and protective factors for suicide in different geographic regions and countries. Higher prevalence rates are observed in developed or high-income countries, and lower rates are observed in developing or low- and middle-income countries, which includes most Islamic countries. In Pakistan and other Asian Muslim countries, which have low suicide rates, data show that suicidal ideation appears to be at a high level.[24–30] There is some evidence that religious beliefs are protective against suicidal attempts. Among religious people, Muslims appear to have a lower rate, as suicide is not allowed in Islam.[31–33] Also, previous studies have suggested that the family is a protective factor in suicide attempts.[29,30] Strong family cohesion, with support from children and relatives, is a protective factor against suicide attempts for Turkish PD patients. Therefore, these factors may have contributed to the absence of suicide attempts observed in our study.

We examined major demographic and clinical risk factors that have been associated with suicidal ideation in PD. In terms of demographic variables, only education level was associated with suicidal ideation in univariate analyses. Some earlier studies have proposed that poor education, being married, and being a younger PD patient may be associated with a higher risk for suicide among PD patients.[3,10,22] In our study, marital status and age did not influence suicidal ideation. In terms of PD-related variables, only age of PD onset and disease duration were associated with suicidal ideation. It has also been suggested that suicidal ideation might be increased in patients with earlier disease onset. The presence of motor fluctuation, postural instability, dyskinesia, and LEDD has not been found to represent significant risk factors for suicidal ideation in previous studies. Our findings are in accordance with these studies.[2,3,8–10] Similar to the findings of Nazem et al,[3] depression and a history of ICD behaviors were also associated with suicidal ideation. Therefore, particularly in depressed PD patients, we should actively screen for suicidal behavior. However, suicidal ideation and attempts are more frequent in PD patients with ICDs, which are frequently associated with dysexecutive symptoms.[3,9] Some studies have suggested that suicidal ideation may be a true depressive phenomenon, although suicide attempts may be related to more severe executive deficits.[9] One explanation for low suicide attempts may be executive dysfunction, which would compromise suicidal planning.[8–10]

The basic limitation of our study was the lack of a control group. Therefore, we cannot claim with certainty that suicidal ideation is more frequent in PD than in the age-matched general Turkey population. As the main purpose of the study was to determine suicide predictors, no control group was established. A significant proportion of patients had early onset PD. However, this feature of the sample was important, so as to address whether age at onset would be relevant for suicidal behavior.

In conclusion, our results have some interesting clinical implications. They give additional support to previous studies that demonstrated frequent suicidal ideation in PD, although suicide attempts were not prevalent. As suicidal ideation is a risk factor for suicide attempts, suicidal ideations should be suppressed, and such patients should be followed closely. Moreover, our results suggest that suicidal ideation can be entirely predicted by lower education level, younger age at PD onset, disease duration, major depression, and presence of a history of ICD behaviors in the Turkish PD population. Therefore, PD patients whose disease started at earlier ages and with longer disease duration should be examined closely with regard to depression and ICD at each visit, and should definitely be treated promptly if any symptoms are found.

Disclosure

The authors report no conflicts of interest in this work.

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