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Effect of Age on Geriatric Depression Scale Performance in Parkinson's Disease

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Abstract

The purpose of this study was to compare the validity of the 15-item Geriatric Depression Scale (GDS-15) in nonelderly (<65 years), young-elderly (age, 65–75), and old-elderly (>75 years) patients with Parkinson's disease (PD). 57 nonelderly, 88 young-elderly, and 81 old-elderly PD patients were administered the GDS-15 and the Structured Clinical Interview for DSM-IV depression module. Receiver-operating characteristic (ROC) curves were plotted for GDS-15 scores against a DSM-IV diagnosis of major or minor depression. The discriminant validity of the GDS-15 was high for nonelderly, young-elderly, and oldelderly subjects (ROC area under curve = 0.92, 0.91, and 0.95, respectively), with optimal dichotomization at a cut-off of 4/5 (85% sensitivity and 84% specificity in nonelderly; 89% sensitivity and 82% specificity in young-elderly) and 5/6 (90% sensitivity and 90% specificity in old-elderly). In conclusion, the GDS-15 has comparable validity in younger and older PD patients, suggesting its appropriateness as a depression screening instrument in PD patients of all ages.

Keywords

Parkinson's disease; depression; age; Geriatric Depression Scale

Major or nonmajor depression in Parkinson's disease (dPD) affects up to 40% of patients.¹ Depression in PD contributes to functional disability,² diminished quality of life,³ increased caregiver distress,⁴ and more rapid cognitive decline.⁵ Despite its frequency and adverse effects, dPD appears to be underrecognized and undertreated, even in specialty care settings.^{6,7} Therefore, it is important for clinicians to have simple, valid screening instruments for dPD.

Owing to symptom overlap and psychiatric comorbidity, diagnosing dPD can be challenging, and so validating depression rating scales in PD is important. For a scale to be useful as a screening instrument, the proposed cut-off point should maximize the proportion of depressed patients scoring positive for depression (sensitivity) and maximize the proportion of negative test results corresponding to nondepression (negative predictive value [NPV]). To be useful as an instrument to differentiate depressed from nondepressed individuals, it should have high sensitivity and specificity (i.e., discriminant validity), which maximizes the proportion of patients whose test results are accurate.

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Numerous depression rating scales have been validated for use in PD, including the Hamilton Depression Rating Scale (HDRS),⁸⁻¹⁰ the Montgomery- Åsberg Depression Rating Scale (MADRS),⁸ the Beck Depression Inventory (BDI),¹¹⁻¹³ the Hospital Anxiety and Depression Scale (HADS),¹⁴ and the 15-item⁹ and 30-item¹⁵ Geriatric Depression Scales (GDS-15 and GDS-30, respectively). Only the HDRS,⁸ MADRS,⁸ and GDS⁹ adequately dichotomize patients into depressed and nondepressed groups. To our knowledge, there is no published literature on the performance of any of these instruments in PD across the age span.

The GDS was constructed with the following thoughts in mind regarding geriatric depression: (1) vegetative symptoms are common in nondepressed elderly persons; (2) thoughts of death and hopelessness about the future have different meanings for those in the later stages of life; (3) medical comorbidity is common in the geriatric population and may be associated with motor retardation or decreased activity levels; (4) comorbid cognitive impairment may affect concentration and cognitive processing.

The GDS-15¹⁶ is a widely-used instrument for the screening of depression in the elderly. It is brief, nonsomatically focused, and can be either observer- or self-administered. Scores range from 0 to 15, with higher scores indicating more severe depression. Though the GDS-15 was developed and originally validated in elderly patients, there is preliminary evidence that it has good internal reliability down to age 40 in a general adult population.¹⁷

In PD, the optimal cut-off point for the GDS-15 as a screening instrument for depression was found to be 4/5,⁹ but test performance across different age groups was not examined in that study. Though patients with PD are typically older, there are many younger adults with the disease, and so it is important to know how depression rating scales perform in patients of all ages. This manuscript reports data on the validity of the GDS-15 in younger and older PD patients.

METHODS

Subjects

The study population consisted of a convenience sample of 226 PD outpatients, including nonelderly (<65 years), young-elderly (age, 65-75), and old-elderly (>75 years), at the Parkinson's Disease Centers at the Philadelphia Veterans Affairs Medical Center and the University of Pennsylvania. The Institutional Review Boards at the two institutions approved the study, and only patients able to provide written informed consent were included. Subjects were participants in a study evaluating the frequency and correlates of dPD and were diagnosed with idiopathic PD by an attending neurologist with expertise in movement disorders.

Procedures

Subjects were approached or referred for study participation during a routine clinic visit. Patients either self-administered the GDS-15 at home prior to their initial clinic visit or were administered the instrument by a trained research assistant during a clinic appointment. Global cognitive function was assessed by the Mini Mental State Examination (MMSE), severity of parkinsonism was rated with the Unified Parkinson's Disease Rating Scale (UPDRS) motor subscale, and overall PD severity was rated according to the Hoehn and Yahr staging system. A research psychiatrist (DW) or a trained research assistant administered the Depression Module of the Structured Clinical Interview for DSM-IV (SCID) and assigned a diagnosis of depression (either major depression or minor depression, the latter in accordance with the proposed criteria set in Appendix B of the DSM-IV-TR) or no depression. Dysthymia was not included as a depression diagnosis, as our experience has been that it is difficult in PD to accurately assess chronic, consistent changes in mood because of fluctuations in mood, as well

as motor status and treatment, over longer periods of time. Results of the SCID interview constituted the gold standard for a diagnosis of a depressive disorder, as has been the case in most studies validating the use of depression rating scales in PD.^{8-10,12,15}

Statistical Analysis

Between-group comparisons on clinical and demographic variables were made using either ANOVA (continuous variables) or χ^2 statistics (dichotomous variables). Separate receiver operating characteristic (ROC) curves were plotted for GDS-15 score versus SCID depression diagnosis in nonelderly, young-elderly, and old-elderly patients. The optimal cut-off point for this study was the GDS value with (1) the highest sensitivity and (2) a sensitivity and specificity both >0.80 . The area under curve (AUC) was used as an overall indicator of the discriminant validity of the instrument. The NPV of the GDS-15 at each cut-off point was also calculated. All analyses were performed with SPSS 13.0.

RESULTS

Characteristics of the sample population by age category are listed in Table 1. Other than the predetermined between-group age differences, elderly patients in general were more likely to be male, have higher UPDRS motor scores, and have lower MMSE scores than nonelderly patients. There were no between-group differences in GDS-15 score or in the frequency of depression diagnosis, suggesting that the GDS-15 provides comparable outcomes for nonelderly, young-elderly, and old-elderly PD patients.

Sensitivity, specificity, NPVs, and percent correctly diagnosed with depression for different GDS-15 cut-off scores for both age categories are presented in Table 2. The overall discriminant validity of the GDS-15 was high for nonelderly, young-elderly, and old-elderly subjects (ROC AUC = 0.92, 0.91, and 0.95, respectively). The optimal cut-off point for the GDS-15 was 4/5 in nonelderly (sensitivity, 0.85; specificity, 0.84) and young-elderly PD patients (sensitivity, 0.89; specificity, 0.82), and 5/6 in old-elderly PD patients (sensitivity, 0.90; specificity, 0.90).

In addition to having high sensitivity and high specificity, a cut-off point of 4/5 on the GDS-15 had a high NPV in both nonelderly and young-elderly patients (NPV = 0.91 and 0.89, respectively), and a cut-off point of 5/6 had a high NPV in the old-elderly patients (NPV = 0.96). At these cut-off points, 84% of nonelderly, 83% of young-elderly, and 90% of old-elderly patients had their depression status correctly identified.

DISCUSSION

The main finding of this study was that the psychometric properties of the GDS-15 are similar in PD patients of all ages. Compared with a DSM-IV-TR diagnosis of depression, the GDS-15 had high and optimal sensitivity, specificity, NPV, and percentage correctly diagnosed at similar cut-off points of 4/5 in nonelderly and young-elderly patients and 5/6 in old-elderly patients. These results suggest not only that the GDS-15 performs similarly in PD patients of all ages, but that its performance and recommended cut-off point are similar to those in non-PD populations.¹⁸

Although both the GDS-30 and the GDS-15 have been validated in PD patients in general, there is no known published research of its performance in different age groups in this population. The clinical utility of the GDS-15 as a screening instrument for dPD depends on its ability to perform similarly in patients across the age spectrum, as a significant percentage of PD patients are nonelderly (25.2% in this convenience sample), and there is some evidence

that early-onset (i.e., <55 years) PD patients are more likely to be depressed than late-onset (i.e., >55 years) PD patients.¹⁹

The fact that the GDS-15 performed similarly in PD patients of all ages is somewhat surprising, given that questions for the instrument were validated solely in the elderly. However, the primary symptoms covered in the GDS include loss of interest, lowered mood, hopelessness, lack of energy, poor self-image, and cognitive problems associated with depression, and these symptoms do overlap significantly with DSM-IV-TR depression criteria, which are not age-dependent.

A practical way to implement routine screening for dPD is important because there is evidence that it remains underrecognized and undertreated.^{6,7} In addition, some PD patients may be unaware of being “depressed” despite endorsing clinically significant depressive symptoms,²⁰ and others may appear to be withdrawn or depressed by observers but not endorse symptoms of depression,²¹ so it is important to specifically validate screening instruments in this population.

Although the HDRS and MADRS also have high discriminant validity in PD, they are lengthy and rater-administered, requiring significantly more time for training and administration. The BDI can only be self-administered and does not adequately discriminate between depressed and nondepressed PD patients.¹² Validation of the GDS-15 as a screening instrument for dPD is of clinical relevance, as it is a brief instrument that can be used easily in routine clinical care.

One limitation of this study was that the data were collected at two tertiary care movement disorders centers, one a veterans’ facility with an almost entirely male population, limiting the generalizability of the findings. In addition, the GDS-15 was both self- and rater-administered, and limitations in the dataset did not allow us to determine which method was used at an individual level.

These results suggest that in PD the GDS-15 is a valid instrument for depression screening and for discriminating depressed from nondepressed patients of all ages. Owing to its ease of use and good test characteristics, the GDS-15 is appropriate for routine use in the clinical care of PD patients. More widespread use of validated screening instruments for dPD could potentially lead to improved treatment and outcomes.

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TABLE 1
Clinical characteristics of nonelderly (age <65), young-elderly (age 65-75), and old-elderly (age >75) PD patients

	Nonelderly	Young-elderly	Old-elderly	F test or χ^2 (df)	P value
Age	(n = 57)	(n = 88)	(n = 81)	523.0 (2, 223)	<0.001
Mean (SD)	56.2 (6.3)	70.4 (3.1)	79.2 (3.0)		
Sex	(n = 57)	(n = 88)	(n = 81)	8.6 (2)	0.01
% Male	77.2	92.0	91.4		
PD duration	(n = 57)	(n = 88)	(n = 81)	<0.1 (2, 223)	0.94
Mean	7.6 (6.5)	7.5 (5.7)	7.6 (5.2)		
UPDRS motor score	(n = 54)	(n = 83)	(n = 77)	5.0 (2, 211)	0.007
Mean	18.5 (9.2)	22.8 (11.7)	24.6 (11.2)		
Hoehn and Yahr stage	(n = 53)	(n = 82)	(n = 76)	1.8 (2, 208)	0.17
Mean	2.2 (0.8)	2.4 (0.7)	2.4 (0.5)		
Daily levodopa dosage (mg/day)	(n = 56)	(n = 88)	(n = 80)	0.7 (78.3)	0.48
Mean	512.8 (384.3)	452.5 (304.5)	452.2 (293.9)		
MMSE	(n = 55)	(n = 87)	(n = 79)	6.7 (2, 218)	0.001
Mean	28.8 (1.7)	27.4 (2.4)	27.5 (2.8)		
GDS-15	(n = 57)	(n = 88)	(n = 81)	0.5 (2, 223)	0.62
Mean	4.5 (4.1)	4.6 (3.8)	4.1 (3.3)		
Depression	(n = 57)	(n = 88)	(n = 81)	1.8 (2)	0.41
% With depression diagnosis	35.1	30.7	24.7		

PD, Parkinson's disease.