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Parkinsonism and Related Disorders 14 (2008) 170–172

Parkinsonism & Related Disorders

www.elsevier.com/locate/parkreldis

Letter to the Editor

The accuracy of the Unified Parkinson's Disease Rating Scale (UPDRS—Section 1) as a screening measure for depression

1. Introduction

Depression is a common feature in Parkinson's disease (PD), with prevalence rates varying between 7% and 70% [1]. To assist in the recognition of non-motor symptoms such as depression, clinicians are often guided by instruments such as the Unified Parkinson's Disease Rating Scale (UPDRS) [2]. This study sought to assess whether the UPDRS item relating to depression would accurately identify patients who required further screening by comparing it to three depression measures that have been validated for use in the PD population: the Beck Depression Inventory-II (BDI-II), Geriatric Depression Scale (GDS) and Hospital Anxiety and Depression Scale (HADS) [3–5]. Because there is no consensus regarding which measure should be used to screen depression in PD. We also examined the level of agreement among these scales using the optimal suggested cut-offs for this patient group.

2. Methods

The study gained approval from the local ethics committee and written consent was obtained from patients. Inclusion criteria were: no evidence of dementia (Mini Mental Status Exam (MMSE) of $\geqslant 25$) confirmed diagnosis of PD and <80 years of age. Fifty-nine patients who met the inclusion criteria volunteered to take part. Depression was assessed using the following measures: GDS (30 items rated 0/1 with a maximum score of 30), BDI-II (21 items rated 0–3 with a maximum score 63), and HADS (7 items related to depression each rated 0–3 with a maximum score of 21). For both the BDI-II and the GDS, 14 and above is recommended for detecting the presence of depression (probable depression), and 9 and above for screening purposes (possible depression). For the HADS, 11 and above is used for detecting probable depression and $\geqslant 8$ for possible depression. All of these measures were self-rated and higher scores indicated more depressive symptoms. The UPDRS has a single screening item for depression (0 = no depression to 4 = sustained depression with vegetative symptoms and suicidal thoughts or intent). Patients with a score of 0 were considered to have no depressive symptoms, 1–2 possible, and 3–4 probable depression. This question was rated by a single examiner, trained by a neurologist who specialized in the area of PD, using a semi-structured interview format.

All participants completed the GDS, BDI-II, MMSE, and UPDRS during the testing session and completed the HADS later at home returning the forms after 1 week (only 46 patients returned the HADS).

3. Statistical analysis

The relationship between the different measures of depression was assessed using Pearson's correlations. We then examined how well the UPDRS predicted possible and probable depression, as defined by the BDI-II, GDS or HADS score exceeding the respective cutoff, through percentage agreement and Receiver Operating Characteristic (ROC) analyses.

4. Results

Overall 29/59 patients (49%) had scores indicative of possible depression using the BDI-II, GDS or HADS. Correlations were moderately strong between the UPDRS and BDI-II: $r = .61$, $p < .001$; GDS: $r = .63$, $p < .001$; and HADS: $r = .42$, $p < .01$. The BDI-II and GDS were highly correlated: $r = .77$, $p < .001$. Correlations between the HADS and BDI-II and GDS were also positive: $r = .53$, $p < .001$ and $r = .66$, $p < .001$.

Table 1 shows crosstabulations between the UPDRS as diagnostic screen and the BDI-II, GDS, and HADS. The UPDRS diagnostic screen agreed with the BDI-II in only 54.3% of total cases, the GDS in 55.9% of cases and the HADS in 56.5% of cases.

False negatives were unacceptably high: Of the patients that had possible or probable depression according to the BDI-II and GDS, the UPDRS indicated no depression for 33% of BDI-II cases and 30% of GDS cases. The proportion of cases identified by the HADS with possible or probable depression was significantly lower compared to the BDI-II: $\chi^2 = 20.54$, df = 1, $p < .001$, and the GDS: $\chi^2 = 9.14$, df = 1, $p < .01$).

We conducted a series of ROC analyses in which the UPDRS was used to predict possible/probable and probable depression, as defined by meeting the criteria for possible or probable depression on the BDI-II and GDS. The HADS was not used as a criterion for this analysis because it identified only a small number of cases with possible and probable depression. For sake of comparison, we also used the BDI-II and GDS to predict possible/probable depression according to the GDS and BDI-II, respectively. The UPDRS achieved only moderate levels of accuracy in predicting possible depression: AUC values for possible depression according to the BDI-II and GDS were .69 and .71, respectively. Corresponding AUC values for the BDI-II predicting possible depression

1353-8020/$ - see front matter
doi:10.1016/j.parkreldis.2007.03.002

Table 1
Crosstabulation of diagnostic screen classifications (“not depressed, “possible depression”, and “probable depression”) obtained with UPDRS and with three validated psychometric tests for depression (BDI-II, GDS, and HADS)

	UPDRS = 0, not depressed	UPDRS = 1–2, possible depression	UPDRS = 3–4, probable depression	Category percentage	Percentage agreement
BDI-II[a]					
Not depressed (<9)	22	13	0	59.3	62.9
Possible (9–13)	7	6	0	22.0	46.2
Probable (⩾14)	1	6	4	18.6	36.4
% UPDRS categories	50.8	45.8	6.8		
Total agreement					*54.3*
GDS[b]					
Not depressed (<9)	24	15	0	66.1	61.5
Possible (9–13)	5	5	0	16.9	50.0
Probable (⩾14)	1	5	4	16.9	
% UPDRS categories	50.8	42.4	6.8		
Total agreement					*55.4*
HADS[c]					
Not depressed (<8)	24	17	2	93.5	55.8
Possible (8–10)	0	2	0	4.3	100.0
Probable (⩾11)	0	1	0	2.3	0.0
% UPDRS categories	52.2	43.5	4.3		
Total agreement					*56.5*

Category percentage indicates the proportion of cases in each diagnostic classification for the BDI-II, GDS, and HADS. The percentage agreement column shows the percent of cases with a particular diagnostic classification for which the UPDRS gave the same classification; italic numbers indicate the overall percent agreement of UPDRS screen for each of the psychometric tests.

[a] Beck Depression Inventory-II.

[b] Geriatric Depression Scale.

[c] Hospital Anxiety Depression Scale. Only a portion of the participants completed the HADS ($n = 46/59$).

according to the GDS, and vice versa, were .85 and .84, which were significantly greater than UPDRS accuracy, $z = -2.35$, $p < .01$ and $z = -1.64$, $p < .05$. The UPDRS was more accurate in predicting probable depression according to the BDI-II and GDS, with AUC values of .85 and .85. These values were less than those for the BDI-II and GDS predicting probable depression according to the GDS and BDI-II, AUCs = .95 and .96, although the differences did not reach significance, $z = -1.51$ and -1.52, both *ns*.

5. Discussion

Overall, 29 of 59 cases were identified as having possible depression by the BDI-II, GDS or HADS. The UPDRS failed to identify 34% of these cases as having any depressive symptoms whatsoever, which is an unacceptably high Type II error rate. ROC analyses showed that the UPDRS had only moderate accuracy overall for predicting possible depression, as measured by BDI-II and GDS, with average AUC = .70. There was a high level of agreement between the BDI-II and GDS. By contrast, the HADS identified significantly fewer of the patients as having possible or probable depression compared to the BDI-II or the GDS. It is possible that the suggested cut-off scores for this measure are too conservative for use with PD patients.

6. Conclusion

The UPDRS in its present form has limited utility as a screening instrument for possible depression. Administration of more comprehensive measures such as the BDI-II or GDS is advisable.

Acknowledgements

This project has been supported by grants from the Canterbury Medical Research Foundation. Audrey McKinlay was sponsored by a scholarship from the Foundation for Science Research and Technology and by a Claude McCarthy Fellowship.

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A. McKinlay, R.C. Grace, J.C. Dalrymple-Alford, D. Roger
Psychology Department, University of Canterbury, Private Bag 4800, Ilam, Christchurch 8004, New Zealand
E-mail address: aco24@student.canterbury.ac.nz (A. McKinlay)

T. Anderson, J. Fink
Christchurch School of Medicine and Health Sciences, Christchurch, New Zealand

J.C. Dalrymple-Alford, T. Anderson, J. Fink
Van der Veer Institute for Parkinson's and Brain Research, Christchurch, New Zealand