Validation of a motor screen for undiagnosed parkinsonism: The Baylor Functional Assessment Screen (BFAS)

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OBJECTIVE

To evaluate the sensitivity and specificity of a motor screening questionnaire designed to distinguish between individuals with and without parkinsonism. The ultimate goal is to develop a Parkinson's disease (PD) screening instrument for use in community settings.

BACKGROUND

There is an unmet need to develop and validate highly sensitive and specific screening instruments targeting parkinsonian symptoms that would differentiate subjects with PD and other parkinsonian disorders from normal controls (Tanner et al, 1990). Rest tremor, difficulty walking, difficulty arising from a chair and walking slowly have been found to be highly specific (93.8-95.9%) but less sensitive (35.9-49.1%) for detecting parkinsonian motor symptoms (Ishihara et al 2005). Clinical diagnosis of PD is based on symptom recognition and examination. Therefore, to detect undiagnosed PD in a community setting, it is important to have a screening tool with high diagnostic sensitivity and specificity. Such a screening instrument will facilitate early diagnosis and institution of an appropriate treatment plan.

METHODS

The Baylor Functional Assessment Screen (BFAS) consists of twelve items, developed by movement disorder experts, which highlight key PD symptoms. Two samples of participants were recruited: normal community dwelling individuals and individuals diagnosed with parkinsonism by a movement disorder expert according to established diagnostic criteria (Jankovic 2008). The sensitivity and specificity of various cut points was then studied with receiver operator characteristic curves, and once an optimum cut point was determined, the positive and negative predictive power was evaluated.

PARTICIPANTS

The parkinsonism group (n=62), recruited from the Baylor College of Medicine Parkinson's Disease Center and Movement Disorders Clinic was 55.6% male with an average age of 66.9 ($SD \pm 11.85$). All were suspected of having PD except 8 patients who had the following diagnoses: dementia with Lewy bodies, cortico-basal degeneration, progressive supranuclear palsy, and multiple system atrophy.

The control group (n=163) was recruited from caregivers who accompanied patients to clinic appointments and from participants at community health fairs. This group was predominantly female (66.1%) and younger than the patient group ($M= 45.8$, $SD=16.4$; t=9.3, p<0.01).

RESULTS

On average, the parkinsonism patients (N=62) endorsed 8.2 ($SD=3.53$) of the items, while the control group (N=163) endorsed 1.4 items ($SD=1.76$). This difference was statistically significant (t=14.47, p<0.001) after controlling for inequality of statistical variances. With both groups combined, the scales internal reliability was excellent (Cronbachs alpha=0.88) with no indication that omitting any one item would improve this value.

To determine an optimum cut point, receiver operator characteristic curve analyses were undertaken. The overall area under the curve was significant (AUC=0.96, SE=0.01, p<0.001) indicating that the scale had excellent discriminant power. Evaluating the curve combined with clinical judgment suggested an optimum cut point of 4, which was used for the classification analyses below.

RESULTS (cont.)

Item	% Endorsed in Parkinsonism Patient Group	% Endorsed in Control Group
Have you been getting slower in your usual daily activities?	81.0	25.0
Is your handwriting smaller?	65.1	4.8
Is your speech slurred or softer?	66.7	7.9
Do you have trouble arising from a chair?	60.3	18.2
Do your lips, hand, arms and/or legs shake?	77.4	7.9
Have you noticed more stiffness?	66.7	32.1
Do you have trouble buttoning buttons or dressing?	67.2	5.5
Do you shuffle your feet and/or take smaller steps when you walk?	79.4	4.8
Do your feet seem to get stuck to the floor when walking or turning?	49.2	6.1
Have you or others noted you don't swing one arm when walking?	57.1	4.8
Do you have more trouble with your balance?	73.0	17.6
Have your others noted that you stoop or have abnormal posture?	68.3	8.5

Classification Table

Observed	BFAS >=4		Percentage Correct
	Yes	No	
Parkinsonism	49 True Positives	13 False Negatives	79% Sensitivity
Control	13 False Positives	150 True Negatives	92% Specificity

Positive Predictive Value = 79%

SUMMARY & CONCLUSIONS

The Baylor Functional Assessment Scale (BFAS) is a sensitive self-report questionnaire that can be used as a highly specific and sensitive screening tool to distinguish between PD subjects and normal controls.

- The BFAS is easy to administer and may be used effectively in mass screenings to identify individuals with undiagnosed PD.
- The inter-item reliability of the instrument is excellent and the instrument has high positive predictive value.
- A cut-off score of 4 positive responses to the questions is the optimal cut-score for the BFAS.

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