COMPARISON OF MINI-BESTest VERSUS BERG BALANCE SCALE TO EVALUATE BALANCE DISORDERS IN PARKINSON'S DISEASE

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INTRODUCTION

Postural instability is a common cause of falls in people with PD. In contrast to community dwelling adults over age 65, approximately 1/3rd of whom report falling each year, upto 70% of individuals with PD fall once annually, while 50% fall twice or more in one year period.

Falls lead to a myriad of complications that can affect not only physical health, but also the psychological health of the individual.

PURPOSE

Due to the negative impact of balance impairments on individuals with PD, it is important to be able to assess who has a balance deficit and is at increased risk of falling. Identification of those at risk is essential in order to intervene, as Physical therapy and exercise have been shown to improve balance.

There are many different balance outcome measures and fall risk assessments are being used in individuals with PD. Many of these measures have limitations exist including low sensitivity and/or specificity ceiling effects

AIMS & OBJECTIVES

- AIM

  - To Compare the Mini-BESTest versus Berg Balance Scale to Evaluate Balance Disorders in Parkinson's Disease.

- OBJECTIVES

  - To evaluate sensory orientation in patients with Parkinson's Disease.

  - To identify balance deficits in mild PD patients.

  - To check the components of balance with Mini-BESTest against gold standard Berg Balance Scale for Indian population.

METHODS & MATERIALS

- ETHICAL APPROVAL

  HREC of CAM, Karamsad

- This was a cross sectional study
- 77 Subjects with PD aged 40-69 years were recruited as per the subject recruitment procedure.
- STUDY SETTING

  K M Patel Institute of Physiotherapy (KMPIP),
  Shree Krishna Hospital, Karamsad, Gujarat, India

CRITERIA FOR SELECTION

- INCLUSION CRITERIA

  Patients diagnosed with Idiopathic PD by a physician.

  Age group : 40 yrs to 69 yrs

  Both Gender

  EXCLUSION CRITERIA

  Patients with cognitive impairments , Mini-Mental State Examination score of < 24

  Prior orthopedic injuries or impairments that could interfere with mobility such as artificial joints or peripheral neuropathy

  Prior brain surgery

  Diagnosed case of other neurological disorders

  Non- ambulatory Parkinson's patients

METHODOLOGY

Informed Consent form from Subject or primary caregiver of all the subjects was obtained after explaining the purpose of the study.

Primary details were obtained which includes demographic data, clinical profile about higher mental functions, tone, range of motion, functional manual muscle testing, balance assessment using BBS and Mini BESTest scale, UPDRS (III): a disability rating scale used to examine the motor component in Parkinson's Disease, also Hoehn & Yahr staging was used to classify the severity of the disease.

CONTD...

Both the test were performed consecutively one after the other with adequate amount of rest interval in between the tests (max 15 mins).

All the necessary precautions for the subjects safety were been taken care of.

Data Analysis

		FREQUENCY	PERCENTAGE
GENDER	MALE	50	64.9
	FEMALE	27	35.1
H & Y	1-2	64	83.1
	3-4	13	16.9

Description

	MEAN	SD
AGE	59.20	5.5
UPDRS (III)	45.61	4.02
H & Y	2.06	0.695
BBS	43.42	5.61
MINI BESTest	15.56	2.07

Correlation co-efficient to find relativeness between the variables shows a strong positive association between Mini-BEST and BBS ($r = 0.732, 0.750$) with p value < 0.0001 is statistically significant.

ROC is done to find optimal cut-off point for Mini-BESTest and BBS based on reference to H&Y classification. The AUC for BBS is 0.993 with 95% CI alongwith 100% sensitivity and 92.3% specificity with criterion >37 for the study population. The AUC for Mini-BESTest is 0.996 with 95% CI alongwith 98.4% sensitivity and 100% specificity with criterion >13.

Results

The distribution of scores among the 77 participants with PD on the Mini-BESTest differed significantly from the Berg . The Mini-BESTest scores were significantly less skewed than the Berg (Berg skewness = −714 versus Mini-BESTest skewness = 0.512; $P < 0.001$).

The ability of the Berg and Mini-BESTest was also compared to differentiate PD patients with and without clinical balance deficits. Roughly one third of the participants had a H&Y of 3 or above, indicating postural instability as defined by H&Y.

The area under the ROC curves (AUC) differed for the tests; the AUC for the Berg = 0.993 and the AUC for the Mini-BESTest = 0.996. The 2-sided *P*-value for testing equality of the two AUC values was 0.05

DISCUSSION

The results from this study suggest that the Mini-BESTest may be more useful than the Berg in evaluating balance disorders in patients with PD, especially in those with mild PD balance deficits. Results shows that

(1) although the Mini-BESTest had a high correlation with the Berg, it showed different ceiling effects;

(2) both the Berg and Mini- BESTest correlated with PD severity

(3) the Mini-BESTest test had better sensitivity/specificity then the Berg to identify people with abnormal postural responses.

The high correlation of the Mini-BESTest with the Berg supports concurrent validity since the Berg remains one of the most commonly used clinical scales for balance assessment in people with PD.

But importantly, it was found during the study that there were very different test score distributions across patients with varied levels of severity. Though neither test had a normal distribution, the Mini-BESTest was significantly less skewed(-0.512), indicating that there are less ceiling effects as has been shown previously with the Berg(-0.714) [30].

The high sensitivity of the Mini-BEST is important for clinicians who see patients with mild balance deficits who are seeking to identify and treat potentially preventable mobility problems early in the disease progression.

The Berg has been shown to have excellent test-retest reliability[33] and to correlate significantly with disease severity in PD[31], and the results support the relationship with the UPDRS. Therapists need measures that reflect improvements with intervention so comparing the Mini-BESTest with the UPDRS establishes concurrent validity of the new test with an established one.

A previous study demonstrated the Berg to be useful in identifying balance impairments in people with very severe PD (i.e., H&Y 4), but it could not discriminate subgroups of H&Y scores successfully[32]. In this study, similar results in that the Mini-BESTest was more successful than the Berg at discriminating subgroups of PD severity as measured by the H&Y scale.

Rasch analysis was performed on the full BESTest to obtain the shortened Mini-BESTest that excludes redundant or underused items[26]. Both the Mini-BESTest and the Berg were sensitive (98.4% and 100%, respectively) and specific (100% and 92.3%, respectively) in differentiating those with and without postural response deficits.

Similarly, the Mini-BESTest was also shown to be sensitive (88%) and specific (78%) in identifying PD patients with a history of falls[36].It has been suggested that postural instability in PD is multi-factorial, therefore, a multitude of tests should be administered by physical therapists.[37,38]

Each test item primarily tests one of 4 categories of balance: anticipatory, dynamic gait, reactive control, and sensory orientation .The Berg was not designed with such systems in mind but if a system categorization is assigned to each item, the Berg items primarily evaluate anticipatory and sensory contributions to balance.

There are two additional systems that the Mini-BESTest evaluates, dynamic gait, and reactive postural control, this may explain the added variable plot being significant for the Mini-BESTest adding value to the Berg in relating to disease severity. In other words, the Mini-BESTest usefully distinguishes among those persons that are overly range compressed in the Berg. If a clinician is using the Berg for their PD patients, it may be beneficial to augment testing with the Dynamic Gait Index and the Pull test from the UPDRS. Dynamic gait (cognitive task with gait) and reactive postural control (response to perturbation) items were the most difficult items for people with PD, balance systems that are not assessed using the Berg. Clinicians commonly use single-limb stance for balance assessment.

An example of a difference between testing items in the Berg and Mini-BESTest is the assessment of the single limb stance (item #14 Berg, item #3 Mini-BESTest). In the Berg, the participant chooses either leg, and it is only this side that is assessed. Comparatively, the Mini-BESTest assesses both the left and right leg and records the worst side. In this study, when the Berg was used, assessing only one leg, 23.4% of the participants had some observable difficulty.

When the Mini-BESTest was used, assessing both left and right leg, 54.5% of the participants had some difficulty. Therefore, clinicians should test standing balance on both sides.

This study was limited to people with PD so it needs to be repeated in patients with other pathologies affecting balance control. One potential limitation is that the order of testing was not randomized so fatigue may have factored into test performance. However, participants were given frequent rest breaks to avoid fatigue.

On the other hand difficulty in components of sensory orientation detected that majority of the participants had difficulty in performing those task which was not till date detected by the BBS. Hence this provides an additional advantage to the therapists for their prescription of exercises.

CONCLUSION

Mini-BESTest is useful and easy to administer tool for balance assessment. The Mini-BESTest had a high correlation with the Berg, it had different ceiling effects. Also, Mini-BESTest test had better sensitivity/specificity than the Berg to identify people with abnormal postural responses. Altogether the findings suggest that the Mini-BESTest is a promising tool for identifying balance deficits in patients with mild to severe PD.

FUTURE SCOPE

Gender based comparison can be considered in the further studies.

A further study can be carried out by compiling equal distribution of the severity of the disease in order to obtain optimum results.

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- Thank you.....

  God Bless....

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