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Assessing Research Tools of Timed Get-Up and Go Test and Unified Parkinson's disease Rating Scales on Balance Dysfunction Idiopathic Parkinsonism

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Abstract

Idiopathic Parkinsonism means a disorder of the central nervous system that affects movement, often including tremors. Nerve cell damage in the brain causes dopamine levels to drop, leading to the symptoms of Parkinson's. Idiopathic parkinsonism often starts with a tremor in one hand. Other symptoms are slow movement, stiffness and loss of balance. There are various tests for testing the dynamic balance and progression of the idiopathic Parkinsonism. Such two scales are timed up and go test and unified Parkinson's disease rating scale. This study is an attempt to find the inter-rater and intra-rater reliability of both timed up and go test and unified Parkinson's rating scale. 30 idiopathic Parkinsonism patients were assessed for TUG and UPDRS. For Intra-rater reliability, for both scales the values were taken on 3 different days, whereas to find the inter-rater reliability of them, the values of 3 different raters on the parameters of dynamic balance and generalized disability were taken from the study group. The results were not significant when analysed with ANOVA at $p<0.05$ as the values were strongly consistent thus proving the intra and inter-rater reliability of TUG and UPDRS. This study concluded that the Timed up & go Test and Unified Parkinson's Disease Rating Scale both had a good strength of Inter-rater and Intra-rater reliability in their own aspects to assess the parameters of dynamic balance and generalized disability for idiopathic parkinsonism.

Keywords: Idiopathic parkinsonism; Timed up and go test; Unified parkinson's disease rating scale

Introduction

Idiopathic parkinsonism means a disorder of the central nervous system that affects movement, often including tremors. Nerve cell damage in the brain causes dopamine levels to drop, leading to the symptoms of Parkinson's. Idiopathic parkinsonism often starts with a tremor in one hand. Other symptoms are slow movement, stiffness and loss of balance. Idiopathic parkinsonism is both chronic, meaning it persists over a long period of time, and progressive, meaning its symptoms grow worse over time. It is not contagious (Figure 1).

Figure 1: Idiopathic parkinsonism.

The timed "up and go" test correlates with the balance, gait speed and functional capacity. The patient is asked to rise from the arm chair, walk 3 m, turn return to the chair and sit [1]. For screening 10 seconds are suggested as the cutoff for patients to be describes as "freely mobile," which appears to predict the patient's ability to go outside safely [2].

Test-retest reliability was estimated using the intraclass correlation coefficient (ICC) for the total UPDRS score, the mental, ADL and motor subscale scores, and other derived subscale scores. The findings are in agreement with previous reports on interrater reliability [3].

There are various tests for testing the dynamic balance and progression of the Parkinsonism. Such two scales are timed up and go test and unified Parkinson's rating scale. This study is an attempt to find the inter rater and intra rater reliability of both timed up and go test and unified Parkinson's rating scale [4].

Objectives

1. To find the Inter rater and Intra rater reliability of timed up and go test for dynamic balance in idiopathic parkinsonism.

2. To find the Inter rater and Intra rater reliability of unified Parkinson rating scale for disability in idiopathic parkinsonism.

Materials and Methods

Study design

This study is a descriptive design involving the Intra-rater and Inter-rater reliability of two different scales namely Unified Parkinson's disease Rating Scale and Timed get-up and go test with 30 idiopathic parkinsonism.

Sample selection

Thirty idiopathic parkinsonism were selected based on selection criteria by way of convenient sampling.

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Selection criteria

Inclusion criteria

1. Both male and female patients clinically diagnosed as idiopathic parkinsonism.

2. Idiopathic Parkinsonism with age group between 60 to 75 years.

3. Idiopathic Parkinsonism with mini mental status examination score above 23.

Exclusion criteria

1. Idiopathic Parkinsonism with age below 60 years and above 75 years.

2. Idiopathic Parkinsonism with mini mental status examination score below 23.

3. Idiopathic parkinsonism with other systemic illness.

4. Idiopathic parkinsonism with uncontrolled diabetes.

5. Idiopathic parkinsonism with any associated musculoskeletal problems.

6. Idiopathic parkinsonism with any recent surgery.

Materials

1. Chair with arm-rest

2. Stop watch

3. Measuring rule/tape

4. Pencil, Pen and paper

5. Black tape

Measurement

Generalized disability and Dynamic balance will be the parameters of the study.

1. Generalized disability will be measured using Unified Parkinson's disease Rating Scale (Figure 2).

Figure 2: A PD subject assessed using UPDRS.

2. Dynamic balance will be measured using Timed up and go test (Figure 3).

Figure 3: A PD subject assessed using timed up & go test.

Procedure

Thirty idiopathic parkinsonism in the age group of 60-75 years were selected based on selection criteria.

Results

It shows the mean and standard deviation values of Timed up & go test assessed for dynamic balance of the idiopathic parkinsonism considered for the study (Tables 1-4).

Subjects	N	Mean	Variance	SD
Male	18	65.66	17.76	4.21
Female	12	65.33	14.06	3.74
Total	30	65.53	15.77	3.97

Table 1: Mean, variance and standard deviation values of age according to Sex in the study group.

Subjects	N	Mean	Variance	SD
Male	18	24.53	1.77	1.33
Female	12	24.38	1.78	1.33
Total	30	24.75	1.84	1.35

Table 2: Mean, variance and SD values of MMSE Scores.

Age group in years	Male		Female	
	Frequency	Percentage	Frequency	Percentage
≤ 60	2	11.11	1	8.333
61-65	8	44.44	5	41.67
66-70	6	33.33	5	41.67
71-75	2	11.11	1	8.333
Total	18	100	12	100

Table 3: Frequency and percentage distribution of sex according to age group in the study group.

Time interval	No. of subjects	Mean	SD
Day 1	30	14.23	6.24
Day 2	30	13.77	6.15
Day 3	30	13.32	5.89

Table 4: Mean and SD values of TUG on three trials taken for consistency on three different days.

It shows the mean and standard deviation values of Unified Parkinson's Disease Rating Scale assessed for the generalized disability level of the idiopathic parkinsonism considered for the study. It's clear

from the table that the mean values of UPDRS taken on 3 different days are in close approximation to each other (Figure 4) (Tables 5 and 6).

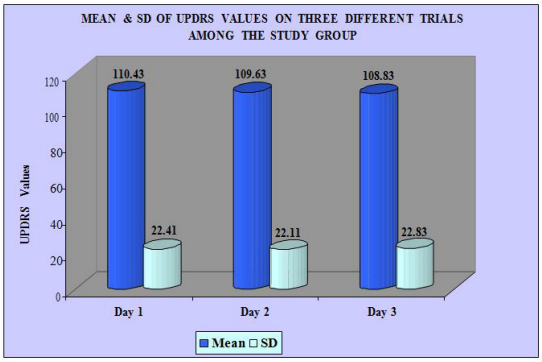

Figure 4: Mean and SD of UPDRS values 3 different trials.

Time interval	No. of subjects	Mean	SD
Day 1	30	110.43	22.41
Day 2	30	109.63	22.11
Day 3	30	108.83	22.83

Table 5: Mean and SD values of UPDRS on three trials taken for consistency on three different days in the study group.

Assessed by	No. of subjects	Mean	SD
Rater 1	30	13.49	5.85
Rater 2	30	13.7	6.1
Rater 3	30	13.51	5.93

Table 6: Mean and SD values of tug taken by three different raters for consistency in the study group.

It shows the mean and standard deviation values of Timed up and Go Test assessed for the dynamic balance of the idiopathic parkinsonism considered for the study. It's clear from the table that the mean values of TUG taken by 3 different raters are in close approximation with each other (Table 7).

Assessed by	No. of subjects	Mean	SD
Rater 1	30	108.63	22.51
Rater 2	30	109.36	22.06
Rater 3	30	109.56	21.96

Table 7: Mean and SD values of UPDRS taken by three different raters for consistency in the study group.

It shows the mean and standard deviation values of Unified Parkinson's Disease Rating Scale assessed for the generalized disability level of the idiopathic parkinsonism considered for the study. It's clear from the table that the mean values of UPDRS taken by 3 different raters are in close approximation with each other (Figure 5) (Table 8).

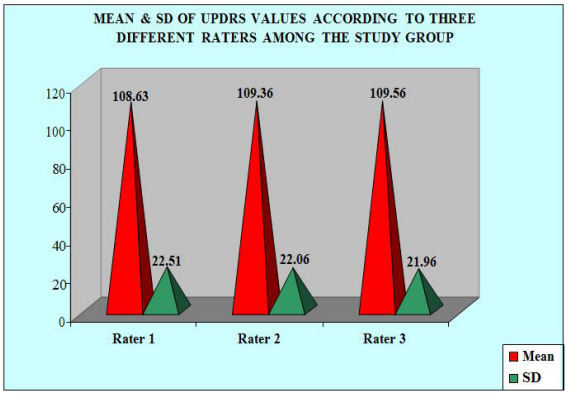

Figure 5: Mean and SD of UPDRS values according to three different raters.

Interpretation

The above table of ANOVA shows the calculated F value (0.1669) as lesser than the table value at $p<0.05$ for the values of TUG to assess the dynamic balance of idiopathic parkinsonism considered for the study. It can be inferred from the table that there is no significant variations between the TUG values taken on three different days, thus proving the consistency of the test results. Hence Timed up & go test is a reliable measure with good amount of intra-rater reliability (Table 9).

The above table of ANOVA shows the calculated F value (0.038) as lesser than the table value at $p<0.05$ for the values of UPDRS to assess the generalized disability level of the idiopathic parkinsonism considered for the study. It can be inferred from the table that there is no significant variations between the UPDRS values taken on three different days, thus proving the consistency of the test results. Hence Unified Parkinson's Disease Rating Scale is a reliable measure with good amount of intra-rater reliability (Table 10).

The above table of ANOVA shows the calculated F value (0.012) as lesser than the table value at $p<0.05$ for the values of TUG to assess the dynamic balance of idiopathic parkinsonism considered for the study. It can be inferred from the table that there is no significant variations between the TUG values taken by three different raters, thus proving the consistency of the test results. Hence, Timed up & go test is a reliable measure with good amount of inter-rater reliability (Table 11).

Source of Variation	Sum of squares (SS)	Degrees of freedom (df)	Mean Square (MS) MS=SS/df	F Ratio	5% F-limit (from the table)
Between Samples	12.42	(3-1)=2	6.212	0.1669	F (2, 87) is 3.15
Within Samples	3236.95	(90-3)=87	37.2		
Total	3249.38	(90-1)=89			

Table 8: Analysis of variance table for the Tug values of study group for Intra-rater reliability of Tug.

Source of variation	Sum of squares (SS)	Degrees of freedom (df)	Mean Square (MS) MS=SS/df	F Ratio	5% F-limit (from the table)
Between Samples	38.4	(3-1)=2	19.2	0.038	F (2, 87) is 3.15
Within Samples	43868.5	(90-3)=87	504.23		
Total	43906.9	(90-1)=89			

Table 9: Analysis of variance table for the UPDRS values of study group for intra-rater reliability of UPDRS.

Source of variation	Sum of squares (SS)	Degrees of Freedom (df)	Mean Square (MS) MS=SS/df	F Ratio	5% F-limit (from the table)
Between Samples	0.86	(3-1)=2	0.4301	0.012	F (2, 87) is 3.15
Within Samples	3093.51	(90-3)=87	35.557		
Total	3094.37	(90-1)=89			

Table 10: Analysis of variance table for the tug values of study group for inter-rater reliability of Tug.

Source of variation	Sum of squares (SS)	Degrees of freedom (df)	Mean square (MS) MS=SS/df	F Ratio	5% F-limit (from the table)
Between Samples	14.488	(3-1)=2	7.244	0.0 147	F (2, 87) is 3.15
Within Samples	42803.3	(90-3)=87	491.99		
Total	42817.8	(90-1)=89			

Table 11: Analysis of variance table for the UPDRS values of study group for inter-rater reliability of UPDRS.

The above table of ANOVA shows the calculated F value (0.0147) as lesser than the table value at p<0.05 for the values of UPDRS to assess the generalized disability level of the idiopathic parkinsonism considered for the study. It can be inferred from the table that there is no significant variations between the UPDRS values taken on three different days, thus proving the consistency of the test results. Hence Unified Parkinson's Disease Rating Scale is a reliable measure with good amount of inter-rater reliability.

The above graphs show the overall comparison of the values of Timed up & go Test in seconds and Unified Parkinson's disease Rating Scale of the idiopathic parkinsonism who were assessed for dynamic balance and generalized disability level respectively using those scales. It is very clear from the graph that there is not much variation seen in the values of TUG & UPDRS when it was assessed on three different days for consistency. There was also a greater degree of consistency in the results using ANOVA; hence both TUG and UPDRS are having very good intra-rater reliability (Figure 6).

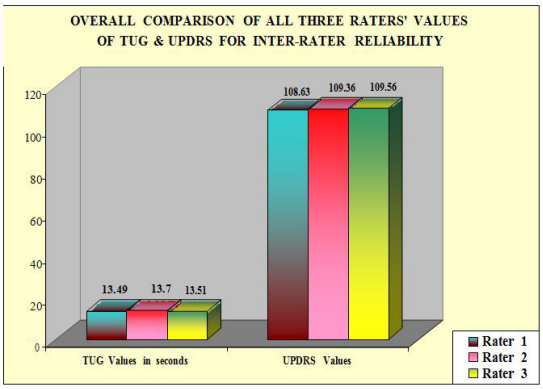

Figure 6: Overall comparison of 3 raters.

It show the overall comparison of the values of Timed up & go Test in seconds and Unified Parkinson's disease Rating Scale of the idiopathic parkinsonism who were assessed for dynamic balance and generalized disability level respectively using those scales.

Discussion

This is a descriptive study to investigate the retest reliability or intra-rater reliability, and inter-rater reliability of the measurements obtained with the TUG & UPDRS in people with idiopathic PD. Performance times were very stable within each session, provided that subjects were allowed one "practice" trial prior to measurement. Adequate care was taken that the performance shouldn't be variable after medications had been withdrawn for 12 hours [5].

According to Morris, some patients do not require any physical therapy in that locus of the medication cycle. Optimal physical therapy ensures that neurological assessments and treatments are closely linked, so that changes in rehabilitation and medication can be closely charted using clinical measures that have demonstrated reliability and validity. The TUG & UPDRS appears ideally suited to this task because both has strong inter-rater and retest reliability [6].

The inter-rater reliability of the measurements was excellent for both experienced and inexperienced raters, i.e., one lecturer and two Student Physiotherapists who were doing their post-graduation. Furthermore, Bowes and colleagues recorded at 2, 4, and 6 hours after levodopa medication was given, which falls outside the "on" period used in their investigation (60-90 minutes) and, therefore, makes direct comparison of results difficult [7].

Despite the limitations, the study provides evidence establishing the inter-rater and intra-rater reliability of TUG and UPDRS scores in people with idiopathic PD, warranting replication by clinicians in other countries using larger samples of patients.

Conclusion

The study can be concluded stating that the Timed up and go Test and Unified Parkinson's Disease Rating Scale both had a good strength of Inter-rater and Intra-rater reliability in their own aspects to assess the parameters of dynamic balance and generalized disability respectively in idiopathic parkinsonism.

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