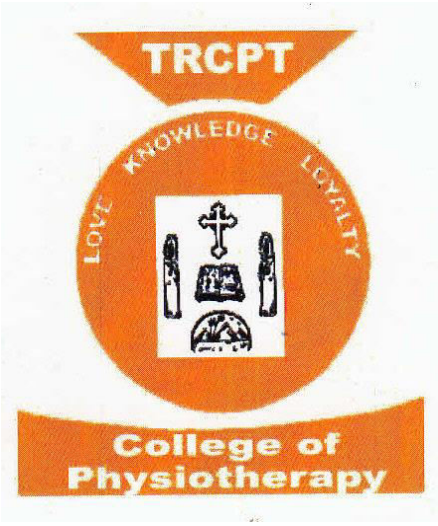
A STUDY TO FIND OUT THE EFFECTIVENESS OF PROGRESSIVE RESISTED EXERCISES IN IMPROVING MOTOR PERFORMANCE AND ACTIVITIES OF DAILY LIVING IN IDIOPATHIC PARKINSONS DISEASE



(Reg No: 271720142)

MPT-NEUROLOGY

Dissertation Submitted To

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI

TOWARDS PARTIAL FULFILLMENT AS REQUIREMENT FOR THE DEGREE

MASTER OF PHYSIOTHERAPY

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CERTIFICATE

This is to certify that the research work entitled **"A STUDY TO FIND OUT THE EFFECTIVENESS OF PROGRESSIVE RESISTED EXERCISES IN IMPROVING MOTOR PERFORMANCE AND ACTIVITIES OF DAILY LIVING IN IDIOPATHIC PARKINSONS DISEASE"** was carried out by the candidate with the **(REG NO: 271720142)** Master of physiotherapy student at Thanthai Roever Collage of Physiotherapy, Perambalur, submitted to Tamil Nadu Dr. M.G.R. Medical University, Chennai towards the partial fulfillment as a requirement for the Degree Master of Physiotherapy **(MPT- NEUROLOGY).**

Prof. C.V. John Franklin, MPT. MIAP.
Principal
Thanthai Roever College of Physiotherapy
Perambalur -621212

CERTIFICATE

This is to certify that the research work entitled **"A STUDY TO FIND OUT THE EFFECTIVENESS OF PROGRESSIVE RESISTED EXERCISES IN IMPROVING MOTOR PERFORMANCE AND ACTIVITIES OF DAILY LIVING IN IDIOPATHIC PARKINSONS DISEASE"** was carried out by the candidate with the **(REG NO: 271720142)** Thanthai Roever College of Physiotherapy Perambalur under the guidance of me towards the partial fulfillment as a requirement for the degree Master of Physiotherapy Submitted to The Tamil Nadu Dr. MGR Medical University Chennai. **(MPT- NEUROLOGY).**

GUIDE

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ABSTRACT

ABSTRACT

BACKGROUND

Parkinson's disease is a chronic, progressive neurodegenerative disease of the nervous system that leads to progressive disability. Idiopathic Parkinson's disease refers to those cases where the aetiology is unknown or genetically determined Physiotherapy has an important role in PD as it focuses on transfers, posture, upper limb function, balance, gait & physical capacity & inactivity. Recent study focusing on motor performance and ADL which must be improved in IPD patients. PRE found to activate the dopaminergic system and increases dopamine availability (Sasco AJ 2010).

OBJECTIVE

To find out the effectiveness of Progressive Resistance Exercise over Conventional therapy on Activities of Daily Living and Motor Performance in IPD.

METHODS

Pre-Test, Post-Test Experimental design was conducted on 30 diagnosed cases of IPD. Patients were divided into two groups of 15 each. Informed consent was obtained from all patients. Group A received conventional physiotherapy treatment. Group B received conventional therapy along with PRE. PRE program consists of 10 strengthening exercises. Warm up exercises was given to find RM. UPDRS 2 and UPDRS 3 was assessed before and after treatment duration was 4 weeks, 3 days per week.

RESULTS AND DISCUSSION

The tests used for statistical analysis were Mann-Whitney U test and Wilcoxon signed rank test. The results showed that, both groups showed improvement in ADL and Motor Performance. Even though both groups showed improvement, Group B showed more changes in ADL and Motor Performance than in Group A. It indicates that PRE is effective to improve ADL and Motor Performance in IPD patients. PRE found to be more effective in Parkinson's

disease, because repetitively generating large forces increases neuronal activation in basal ganglia circuits more so than small forces.

The Blood Oxygen Level Dependent (BOLD) signal increases in specific basal ganglia nuclei, ventral thalamus and motor cortex with repetitive force generation. Research suggests that PRE can increase dopamine level and metabolism, which subsequently in functional independence in PD subjects (Sasco AJ, 2010).

CONCLUSION

Progressive Resistance Exercise along with Conventional Therapy is effective in improving Motor Performance and Activities of Daily Living in patients with IPD.

KEYWORDS

IPD – Idiopathic Parkinsons Disease, ADL – Activities of Daily Living

INTRODUCTION

INTRODUCTION

BACKGROUND OF THE STUDY Parkinsons Disease (PD) is a chronic, progressive disease of the nervous system, It is a neurodegenerative condition that leads to progressive disability. (Poew & Machlkneucht'09). Idiopathic Parkinsons disease (PD) is refers to those cases where the aetiology is unknown or genetically determined[1,2]. The clinical hallmarks of PD include bradykinesia, postural instability, pathological tremor (5-6Hz). Activities of daily living (ADL) and muscle power is impaired in PD[3]. PD leads to reduced health related quality of life and high healthcare costs (Weintraub et al '08).

PD occurs in about 1% of population older than 55 years of age and become increasingly common with advancing age. The mean age of onset is between 58 and 62 years of age, with majority of cases having their onset between the age of 50 and 79. Males are slightly more at risk for developing PD than females[4,5]. IPD is observed in all countries, all ethnic groups and all socioeconomic classes, although the incidence in black is only one quarter than in whites. In Asians the incidence is 1/3 to 1/2 than in whites[5].

PD affects an estimated 7 to 10 million people worldwide[6]. The prevalence of the disease is expected to increase substantially in coming years due to aging of population[6]. The prevalence of PD is about half of that reported in most Western countries. Although the prevalence of PD is low in most of country ~ 70 per 100000, the population is more than 1 billion, the number of patients with PD in India is estimated to be 7 million[7].

According to Uday Mutane, Assistant Professor, Neurology, National Institute of Mental Health and Neurosciences (NIMHANS) Bangalore, who analyzed neurons in 84 brains from brain banks in London and Bangalore, the loss of pigmented melanin cells in substantia nigra is 40% less among Indians. The reason is not clear. The antiparkinson medications given to improve the early symptoms of the disease are L-DOPA & Dopamine agonists[6].

Medication influences motor performance markedly, however drug treatment cannot abolish all symptoms and physical therapy is often recommended (Iris Reuter 2003).

NEED AND SIGNIFICANCE

Physiotherapy has an important role in PD, as it focuses on transfers, posture, upper limb function, balance (& falls), gait & physical capacity & inactivity. It also uses cueing strategies cognitive movement strategies & exercise to maintain or increase independence, safety & quality of life[8,9]. Exercise may activate the dopaminergic system and increases dopamine availability.

Progressive resisted exercise (PRE) has been suggested as a treatment option to preserve function & health related quality of life (QOL) in PD (David et al 2012, Dibble et al 2009, Falvo et al 2008).

Here the study focuses on the effect of PRE in improving motor performance and ADL in IPD.

HYPOTHESIS

Null Hypothesis – There is no significant effect of PRE in improving motor performance and ADL in IPD.

Alternative Hypothesis – There is significant effect of PRE in improving motor performance and ADL in IPD.

OPERATIONAL DEFINITION

- **Idiopathic Parkinson's Disease:** known case of IPD in stage 2, 2.5 & 3 in Modified Hoehn & Yahr scale and the age group is between 50 and 67 years.
- **Activities of Daily Living:** 13 components performed by the patient based on Unified Parkinson's Disease Rating Scale 2. (Speech, Salivation, Swallowing, Handwriting, Cutting food and handling utensils, Dressing, Hygiene, Turning in bed and adjusting bed clothes, Falling, Freezing when walking, Walking, Tremor, Sensory complaints related to parkinsonism).
- **Motor performance:** 14 components performed by the patient based on Unified Parkinson's Disease Rating Scale 3. (Speech, Facial expression, Tremor at rest, Action or postural tremor of hands, Rigidity, Finger taps, Hand movement, Rapid alternating movements of hands, Foot agility, Arising from chair, Posture, Gait, Postural stability, Body bradykinesia and hypokinesia).
- **Progressive Resistance Exercise:** dynamic resistance training using dumbbell and multi gym machine (Aerofit) exercises. (Shoulder press, Lattisimus pull downs, Reverse flys, Chest press, Biceps curl, Triceps extension, Rotary calf, Seated quadriceps extension, Hip extension).

AIM AND OBJECTIVES

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AIM

To find out the effects of PRE in improving motor performance and ADL in IPD.

OBJECTIVES

- To find out the effects of conventional therapy on motor performance & ADL in IPD.
- To find out effects of PRE on motor performance and ADL in IPD.
- To compare effects of conventional physiotherapy and PRE over conventional therapy on motor performance and ADL in IPD.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Review of literature regarding PRE

1) Daniel M Corcos et al (2013): PRE improves muscle strength, gait initiation & gait speed. PRE in combination with other exercise modalities improve strength, decreases postural sway & decreases fall, improves whole body bradykinesia & improves QOL[3].

2) ACSM Stand: MedSci Sports Exerc(2009): To achieve a balanced increased in muscular strength & endurance, a repetition range of 10 to 15 repetitions at a lower relative resistance for cardiac patients & for patients older than 50 to 60 yrs[14].

3) Lidiane Oliveire Lima et al (2016): PRE improves strength and physical performace in people with mild to moderate PD; systematic review: PRE has been suggested as an treatment option to preserve function and health related QOL in PD.

4) Mikhail Saltychew et al (2016): Progressive resistance training in PD: A systematic review and meta analysis: PRE was found to have a positive effect on muscle strength, mobility, endurance, fat free mass and performance in functional tasks.

5) Feigenbaum MS et al : Med Sci Sports Exerc.(Jan2009): Resistance was set approximately 30-40% of 1RM for upper body exercise and 50-60% of 1RM for lower body exercise during 1st week of training. The resistance was increased by at least 5% or as allowed by equipment[19].

6) Sale DG et.al (2009): Strength gains, observed early resistance training program (after 2 to 3 weeks) as a result of neural adaptation[15].

Review of literature regarding exercise training in PD

7) Susan B O Sullivan et al(2014): Exercise training which are given to PD are relaxation exercises, flexibility exercises, resistance training, functional training, balance training & locomotor training[6].

8) Belinda Bilney et al (2002): Physiotherapy treatment strategies may improve motor performance by increasing the readiness of the neurons within the basal ganglia to signal to supplementary motor area to begin preparation for movement

9) Schenkman (2010): General exercise plus relaxation improve function by enhancing recruitment of appropriate muscle synergies, muscle length and co-ordination.

Review of literature regarding UPDRS

10) Ramaker et al (2009): Unified Parkinsons Disease Rating Scale (UPDRS) is used to follow longitudinal course of PD & most commonly used scale for PD[12].

11) Carole Lewis & Keiba Shaw (2009): Reliability of UPDRS has been examined with results indicating high internal consistency & high test retest reliability in samples of patients at varying stages of PD.

12) Daniel M Corcos et al (2013): PRE demonstrated statistically and clinically significant reduction in UPDRS 3 scores and is recommended as useful adjunct therapy to improve Parkinsonian motor signs[3].

13) B Yousefi et al (2009): Exercise therapy improves activities of daily living and showed significant reduction in UDRS 2 scores in patients with Parkinsons disease.

Review of literature regarding definition

14) Susan Sullivan (2009): (Idiopathic) PD is defined as a chronic progressive disorder of nervous system characterized by cardinal features of rigidity, bradykinesia, tremor and postural instability.

Review of literature regarding clinical features

15) Niall Quinn et al (2009): It is a symptom complex, comprising slowness of movement (bradykinesia), poverty of movement and hypokinesia, difficulty in initiating movement, fatiguing & decrementing repetitive alternating movement[10].

Review of literature regarding Pathology

16) Barron et al (2010): PD is defined by degeneration of the dopaminergic neurons in basal ganglia in pars compact of substantia nigra that produces dopamine and as disease progress and neurons degenerate, the presence of cytoplasmic inclusion bodies called lewy bodies. Loss of melanin containing neurons produces characteristic changes in depigmentation in substantia nigra with a characteristic pallor[11].

Review of literature regarding MMSE

17) Pangman et al (2009): Mini mental state examination (MMSE) is a 30 point questionnaire that is used extensively in clinical & research setting to measure cognitive impairment[13].

18) Lenore Kurlowicz et al (2009): The MMSE has been validated & extensively used in both clinical practice & research.

Review of literature regarding Modified Hoehn & Yahr Staging

19) Hoehn MM, Yahr MD (2012): Parkinsonism: onset, progression, and mortality: Modified Hoehn & Yahr scale is a widely used clinical rating scale, which defines broad categories of motor function in PD.

METHODOLOGY

METHODOLOGY

STUDY DESIGN

Pre–test and post-test experimental group design

STUDY SETTING

1. Neuro one hospital trichy
2. Retna Global hospital trichy
3. Thanthai Roever College of Physiotherapy

SAMPLE SIZE

30 Patients diagnosed with IPD.

SAMPLING TECHNIQUE

Simple random sampling

DURATION OF THE STUDY

6 Months

CRITERIA FOR SAMPLE SELECTION

INCLUSION CRITERIA

- Idiopathic Parkinson's Disease[3]
- Age 50 to 67 years[3]
- Modified Hoehn and Yahr Scale – 2,2.5,3
- On stage of L-DOPA theropy[3]
- MMSE score greater than or equal to 23[3].
- Patient with stable cardiovascular parameters.

EXCLUSION CRITERIA

- All other movement disorders like Secondary PD, Parkinsonism plus syndromes, Young onset PD.
- Other degenerative and demyelinating disorders of CNS.
- Orthopaedic problems such as recent fractures, arthritis.
- Psychiatric and non cooperative patient.
- Patients undergone surgeries for PD.
- Malignancies.

OUTCOME MEASURES

- Unified Parkinson's Disease Rating Scale-2 Activities of Daily Living (ADL)
- Unified Parkinson's Disease Rating Scale-3 Motor Examination

TOOLS

Dumbbells
Sandbags
Weights
Multi gym Aerofit Machine

PROCEDURE

After obtaining ethical approval from Ethical Committee of Little Flower Hospital, 30 patients who were diagnosed with IPD were recruited for the study after obtaining informed consent. Subjects who fulfilled inclusion criteria were randomly assigned into two groups.

GROUP A-

Conventional treatment:-

Total Treatment Duration-45 minutes[6] and after every 15 minutes, 5 minutes rest was given, rest periods was depended upon tolerance of the patient. The exercises given were:

A) Relaxation exercises:

Gentle rocking and rotational exercises were given.

Supine lying, side to side head rotation,

Hook lying, lower trunk rotation,

Side lying, upper and lower trunk rotation

B) Active and passive range of motion (ROM) exercise.

C) Stretching techniques were used to elongate the muscles-4 Repetition, 15-60 sec

D) Posture maintaining exercises:

1) Standing upright in front of mirror
2) Posture correction in front of mirror
3) Strengthening back extensors and hip extensors.

E) Gait training:

1) Patients were made to walk with long strides and adequate ground clearance,
2) Patients were made to walk in front of mirror and by marking footprints on the ground,
3) Stair climbing

GROUP B-

Conventional treatment and PRE

All conventional exercises mentioned above were given along with PRE

PRE Program

- PRE program consisted of 10 strengthening exercises:
- Upper body exercises included were : shoulder press, latissimus pull downs, reverse flys, chest press, biceps curl, triceps extension[3].
- Lower body exercises included were : double leg press, rotary calf (Ankle PF), seated quadriceps extension, hip extension[3].
- Resistance were set at approximately 30-40% of 1 RM for upper body exercises & 50-60% of 1 RM for lower body exercises during 1st week of training[19].
- The resistance increased by 5%[19].

- On the first day, pre test scores were taken and Repetition Maximum (RM) was found out[18]. Warm up exercises were given prior testing RM[18].
- On the second day exercise regime were started.

PROCEDURE FOR FINDING REPETITION MAXIMUM

Initially warm up exercises was given.

Warm up routine[18]

- Jogging
- Forward leg swings
- Shoulder shrugging
- Side leg swings
- Shoulder rotation
- Arm swings

Total duration of warm up exercises was – 15 minutes

Finding out 1 Repetition Maximum[18]

1 RM were found out by doing the same procedure for Chest press, Lattisimus pull downs, Seated quadriceps extension, Hip extension, Shoulder press, Triceps extension, Reverse flys, Double leg press and Rotary calf respectively as described below.

Exercises using Multigym

1. **Chest press:** (muscles involved are Pectoralis, deltoid, triceps)
   Position of the patient: Sitting (facing forwards with back supported)
   Therapist position: Therapist stood besides the patient.

Procedure

- Patient grabbed the right and left handles on each side of the machine with right and left hands and pushed towards the chest and away from the chest and brought back to starting position.

2. **Lattisimus pull downs:** (muscles involved are posterior deltoid, lattisimus dorsi, biceps, brachialis)
   Patient's position : Sitting (facing towards multigym)
   Therapist position: Therapist stood besides the patient.

Procedure

- The patient hold the T-Bar which was placed in the top position of multigym with both hands and it was pulled downwards and then upwards and brought back to starting position.

3. **Seated quadriceps extension:** (muscles involved – quadriceps)
   Patient's position: Sitting
   Therapist position: Therapist stood beside the patient.

Procedure

- Patient kept the legs behind the roll pad and raised the legs and extended the knees and brought back to starting position.

4. **Hip extension:** (muscle – gluteus maximus)
   Patient's position: Standing (facing towards the multigym with foot at same level)
   Therapist position: Therapist and bystander stood besides the patient.

Procedure

- The cuff present at lower position of multigym was tied over the ankle of one leg. Patient extended the leg to the back and then brought back to starting position and same was repeated for the other leg.

5. **Shoulder press:** (muscles involved are anterior deltoid, medial deltoid)
   Patient's position: Sitting (with 45 degrees inclined forwards)
   Therapist position: Therapist and bystander stood beside the patient.

Procedure

- Patient grabbed the right and left handles on each side of the machine with right and left hands and elevated the arm and then brought back to starting position.

6. **Biceps curls:** (muscle involved – biceps)
   Patient's position: Standing (facing multigym)
   Therapist position: Therapist and bystander stood besides the patient.

Procedure

- Patient grabbed the T bar with both hands which was held in the bottom of the multigym and flexed and extended the elbow and then brought back to starting position.

7. **Triceps extension:** (muscle involved – triceps)
   Patient's position: Standing (facing multigym)
   Therapist position: Therapist and bystander stood besides the patient.

Procedure

- Patient grabbed the T bar with both hands which is held in top position of multigym. The patient extended and then flexed the elbow and brought back to starting position.

Exercises using Dumbells

8. **Reverse flys:** (muscles involved are posterior deltoid, rhomboids, middle trapezius)
   Patient's position: Standing
   Therapist position: Therapist and bystander stood besides the patient

Procedure

- The patient's arms were at the side of the body and holded dumbbells on both hands and flexed the back and knee and then patient abducted the arm to 90 degrees. And then the patient lowered the arm.

9. **Double leg press:**

   Patient's position: Standing

   Therapist position: Therapist and bystander stood besides the patient.

Procedure

- The patient's arms were at the side of the body and hold the dumbbells on both hands and flexed the knee and then brought back to starting position.

10. **Rotary calf:** (ankle plantar flexion)

    Patient's position: Standing

    Therapist position: Therapist and bystander stood besides the patient.

Procedure

- The patient's arms were at the side of the body and hold the dumbbells on both hands and then patient raised the heel, and then the heel was lowered.

EXERCISE PROTOCOL

Total treatment duration 4 weeks, 3 days per week.

Rest period was depended upon tolerance of the patient[6].

1st Week

One set – 8 repetitions.

2nd Week

Resistance was increased by 5%.[19]

One set – 8 repetitions

3rd and 4th Week

Resistance was again increased by 5%.

Two sets each week – 8 repetitions

DATA ANALYSIS AND INTERPRETATION

DATA ANALYSIS AND INTERPRETATION

Data collected from subjects were analyzed using Wilcoxon Signed – Rank Test and Mann-Whitney U Test.

Mann – Whitney U Test

- The test was applied on the initial result to find that the two independent group samples are selected from the same parent population and thereby to make the result, obtained acceptable.
- The test was applied on the final result to find that the two independent groups show a significant difference in result and thereby, to find the effectiveness of the treatment intervention over the other group.
- The formula used for the test is,

$$U = n_1.n_{2+(nx(nx+1)/2)} - T_x$$

Where,

n_1 = the number of subjects in the group A.

n_2 = the number of subjects in the group B.

T_x = the larger rank total.

n_x = the number of subjects in the group with higher rank total.

Wilcoxon Signed – Rank Test.

- The test was applied on the pre test and post test value difference of the same group and thereby, to concluded whether treatment intervention was effective or not.

Procedure

1. Add up the total of pre test values.
2. Add up the total of post test values.
3. Find the mean of each value.
4. Calculate the d – difference for each pair of scores.

5. Rank the difference by Tied rank procedure.
6. Write in by each rank the plus or minus sign of the corresponding value.
7. Sum all ranks with same sign separately.
8. Take smaller of the two rank totals and that's the 'T' value.
9. Find the N by counting up the number of subjects omitting the pairs having d = 0.

Table no. 1 Demographic Presentation of Subject

Group	Age in years		Duration in years	
	Mean	SD	Mean	SD
Group A	60.4	±4.94	3.06	±1.40
Group B	59.6	±5.10	2.70	±1.26

Group A consists of 15 PD patients with a mean age of 60.4 years (SD ± 4.94) and duration of condition of 3.06 years (SD ± 1.40).

Group B consist of PD patients with a mean age of 59.6 years (SD ± 5.10) and duration of condition of 2.7 years (SD ± 1.26)

Table no.2 Demographic Presentation of Age

Age in Years	50 – 60	60 - 67
No. of patients in Group A	7	8
No. of patients in Group B	8	7

Group A consisted of 15 patients whose mean age were found to be 60.4 and the Group B consisted of 15 patients whose mean age were found to be 59.6.

Out of the total 30 subjects 15 were in the age group of 50 - 60 and, 15 were in the age group of 60 – 67.

Graph no.1 Age Wise Distribution of Subjects

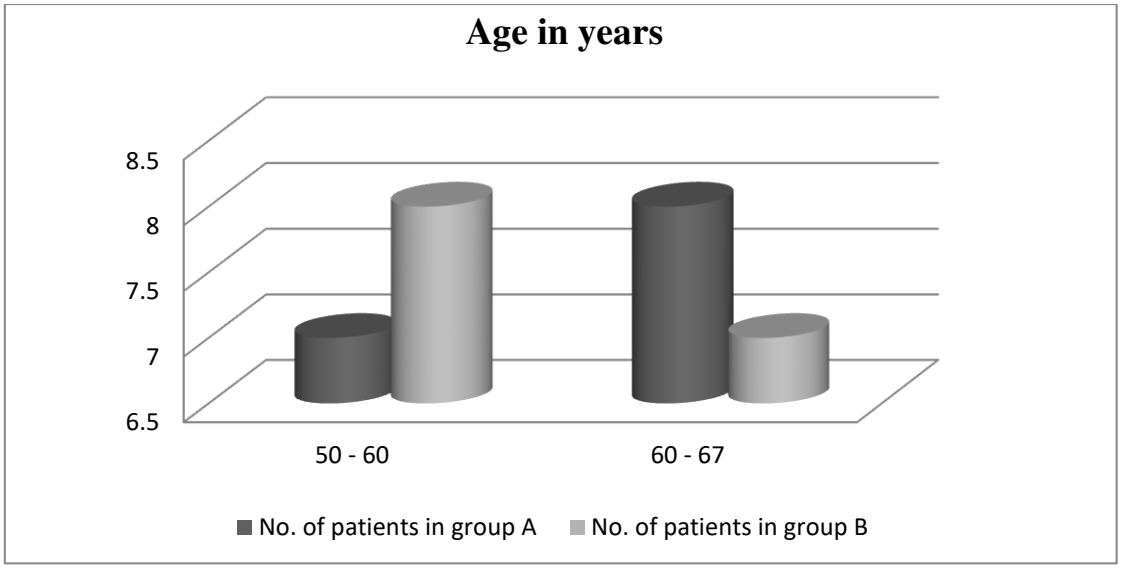


Table no.3 Demographic presentation of Gender

Gender	Male	Female
No. of patients in Group A	9	6
No. of patients in Group B	10	15

60% of patients in Group A were males and 40% were females 66.6% of patients in Group B were females and 33.4% were males.

Graph no.2 Gender Wise Distribution of Subjects

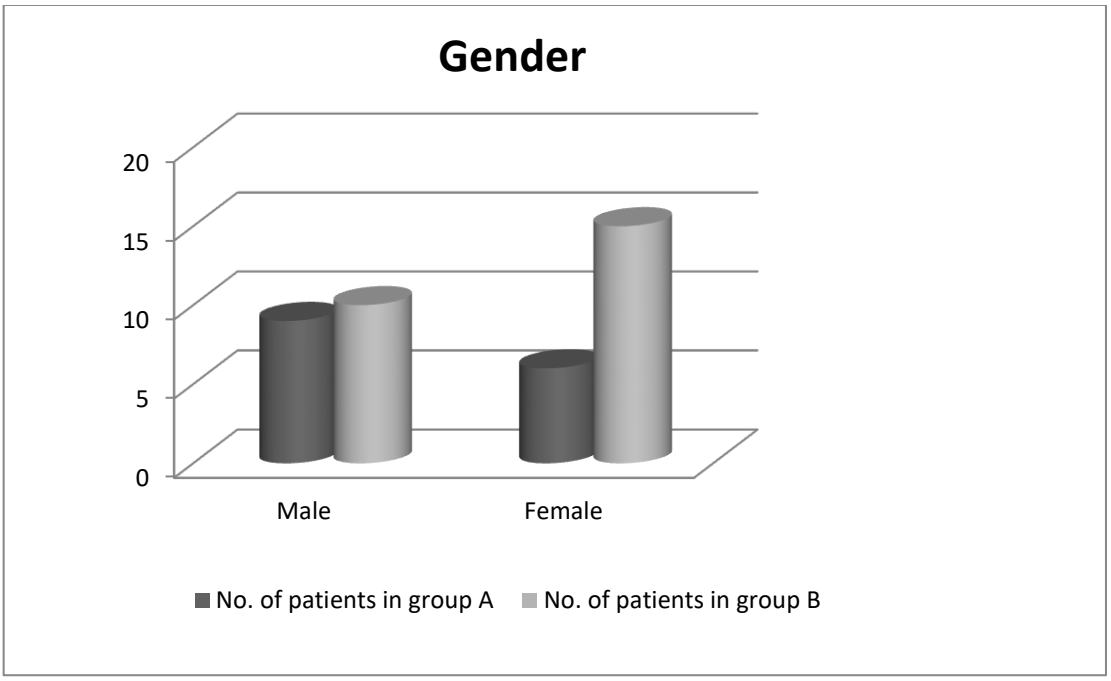


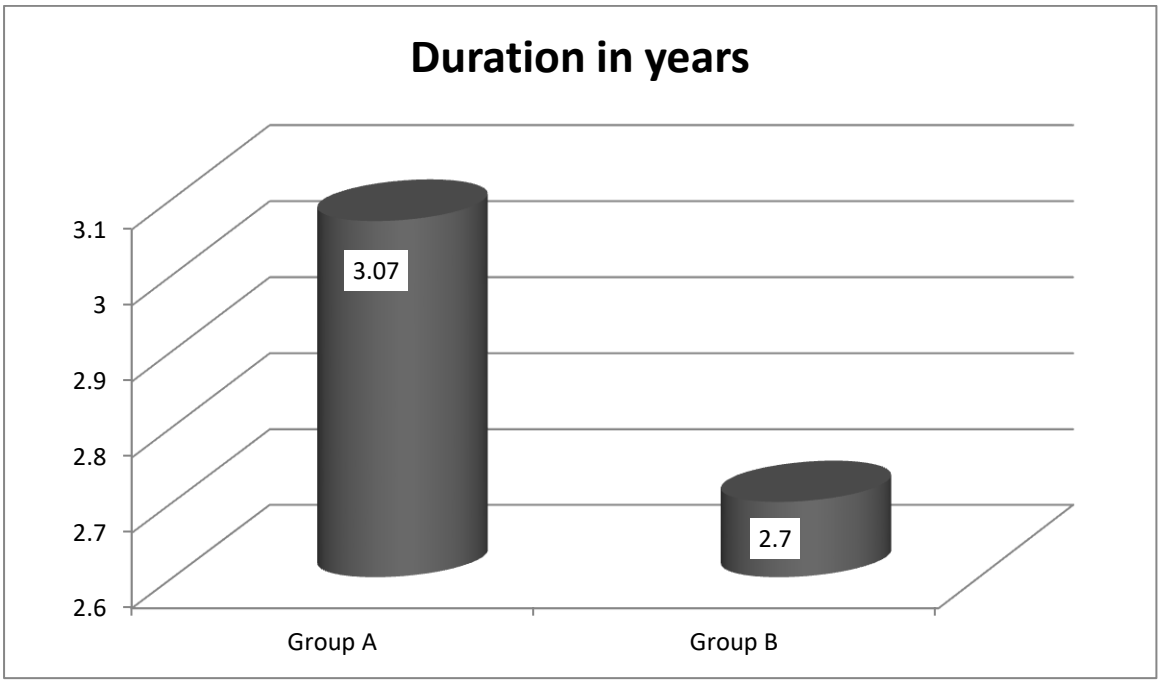
Table no.4 Demographic Presentation of Duration of Disease

Groups	Mean duration	SD
Group A	3.07	± 1.40
Group B	2.70	± 1.26

Group A consists of 15 PD patients with a mean duration of condition of 3.07 years (SD ± 1.4)

Group B consist of PD patients with a mean duration of condition of 2.7 years (SD±1.26).

Graph no.3 Mean Duration



STATISTICAL ANALYSIS OF ADL SECTION OF UPDRS USING MANN WHITNEY U TEST AND WILCOXON SIGNED RANK TEST

Table no.5 Mean Values UPDRS 2 Activities of Daily Living

Group	UPDRS 2 Mean Values			
	Pre test Value	SD	Post test Value	SD
Group A	34	± 6.5	25.4	± 5.88
Group B	36.46	± 5.22	12.66	± 3.46

Graph no.4 ADL Score Mean Value

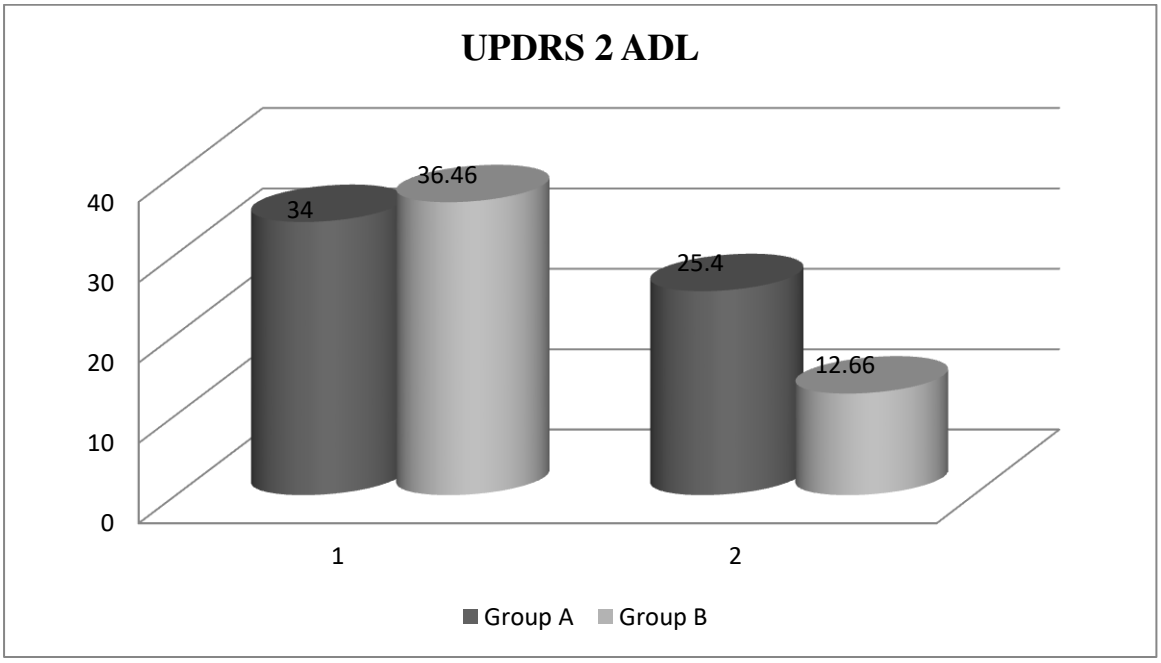


Table no.6 Statistical results – UPDRS 2 ADL

UPDRS 2 score	Initial score	Mann – Whitney U Test's U – value	Final score	Mann – Whitney U Test's U – value	Wilcoxon Signed – Rank Test's T - value
Group A	34	94	25.4	7	0
Group B	36.46		12.66		0

MANN WHITNEY U TEST FOR UPDRS – ADL

a) **Pretest Score**

For 15 degree of freedom and at 5% level of significance, the table value 't' is 64 and the calculated 'U' value is 94. Since the calculated value is greater than table value, there is no significant difference existing between the pretest values of both groups **(p>0.05).**

b) **Post Test Scores**

For 15 degree of freedom and at 5% level of significance, the table value 't' is 64 and the calculated 'U' value is 7. Since the calculated value is less than table value, null hypothesis is rejected. Hence there is significant differences existing between the posttest values of both the groups (since **p<0.05**).

WILCOXON – SIGNED RANK TEST FOR UPDRS – ADL SECTION

a) **Group A**

For 15 degree of freedom and at 5% level of significance, the table value 't' is 25, and the calculated 'T' value is 0. Since calculated value is less than table value, null hypothesis is rejected. Hence there is significant difference between pre and post test values of Group A (since **p<0.05**).

b) **Group B**

For 15 degree of freedom and at 5% level of significance, the table value 't' is 25, and the calculated 'T' value is 0. Since calculated value is less than table value, null hypothesis is rejected. Hence there is significant difference between pre and post test values of Group B (since **p<0.05**).

STATISTICAL ANALYSIS OF UPDRS 3 MOTOR EXAMUNATION SCORE USING MANN WHITNEY U TEST AND WILCOXON SIGNED RANKS TEST

Table no.7 UPDRS 3 Mean Values

Group	UPDRS 3 Mean Values			
	Pre test Value	SD	Post test Value	SD
Group A	34.8	±5.96	25.8	±5.64
Group B	35.8	±5.05	13.06	±3.44

Graph no.5 UPDRS 3 MEAN VALUE

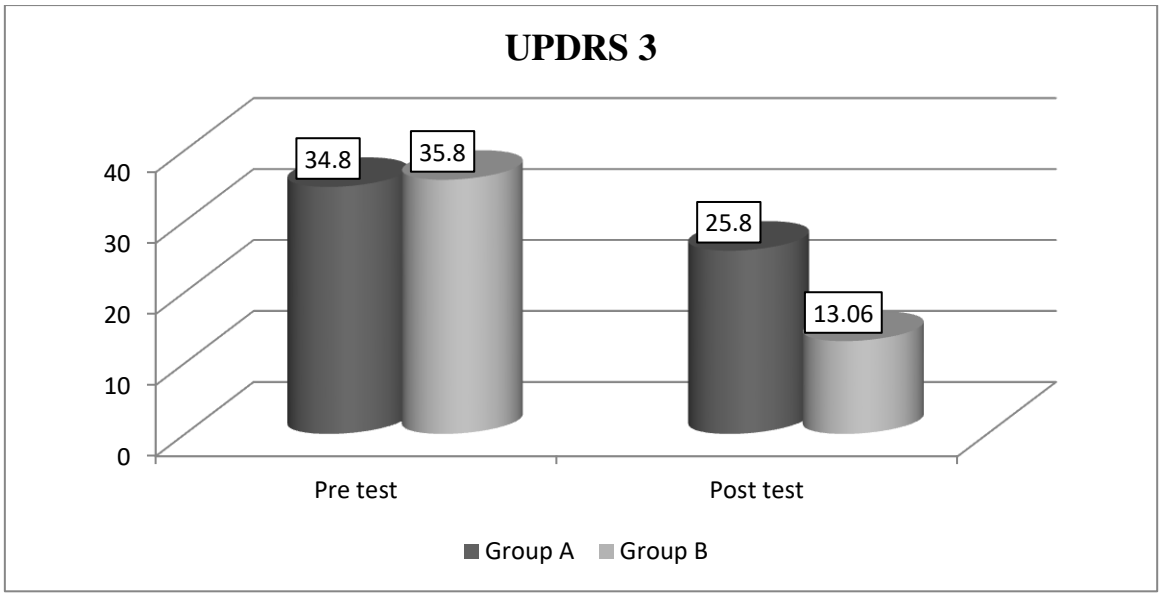


Table no.8 Statistical Results – UPDRS 3 MOTOR EXAMINATION

UPDRS 3 score	Initial score	Mann – Whitney U Test's U - value	Final score	Mann – Whitney U Test's U – Value	Wilconxon Signed – Ranks Test's T-Value
Group A	34.8	93	25.8	4.5	0
Group B	35.8		13.06		0

MANN WHITNEY U TEST FOR MOTOR EXAMINATION

a) **Pretest Score**

For 15 degree of freedom and at 5% level of significance, the table value 't' is 64 and the calculated 'U' value is 93. Since the calculated value was greater than table value, there is no significant difference existing between the pretest values of both groups (**p>0.05**).

b) **Post test Scores**

For 15 degree of freedom and at 5% level of significance, the table value 't' is 64 and the calculated 'U' value is 4.5. Since the calculated value is less than table value, null hypothesis is rejected. Hence there is significant differences existing between the posttest values of both the groups (since **p<0.05**).

WILCOXON – SIGNED RANK TEST FOR UPDRS – ADL SECTION

a) **Group A**

For 15 degree of freedom and at 5% level of significance, the table value 't' is 25, and the calculated 'T' value is 0. Since calculated value is less than table value, null hypothesis is rejected. Hence there is significant difference between pre and post test values of Group A (since **p<0.05**).

b) Group B

For 15 degree of freedom and at 5% level of significance, the table value ‘t’ is 25, and the calculated ‘T’ value is 0. Since calculated value is less than table value, null hypothesis is rejected. Hence there is significant difference between pre and post test values of Group B (since **$p<0.05$**).

RESULTS

RESULTS

The study tried to analyze the effects of PRE along with conventional therapy on Motor Performance and Activities of Daily Living in IPD patients.

Pre and Post test scores of each group were analyzed using Wilcoxon Signed Rank Test and Pre tests scores of both the groups and post test scores of both the groups were analyzed using Mann Whitney U Test.

On statistical analysis of UPDRS 2 ADL and UPDRS 3 Motor Examination using Wilcoxon Signed Ranks Test showed significant difference in the pre test and post test scores of both groups.

On statistical analysis of UPDRS 2 ADL and UPDRS 3 Motor Examination using Mann-Whitney U Test showed significant difference in post test scores of Group B over the Group A. In the pre test scores, calculated value was greater than table value so there proved no significant differences between two groups. In post test scores as the calculated value was less than table value, there proved significant differences between two groups since $p<0.05$ therefore, alternative hypothesis was accepted i.e. there was significant effect of PRE in improving Motor Performance and ADL in patients with IPD.

DISCUSSION

DISCUSSION

The study was an experimental study design to find out the effect of PRE in improving motor performance and ADL in IPD.

30 diagnosed cases of IPD were divided into two groups of 15 each, Group A and Group B. Informed consent were obtained from all patients. Group A received conventional therapy whereas Group B received conventional therapy along with PRE.

The age of subjects were almost identical in both groups (mean age of Group A were 60.4 years and Group B were 59.6 years). The duration of condition was 1 to 6 years after onset. 9 males and 6 females were in Group A and 10 males and 15 females were in Group B.

Both groups were assessed on the first day and last day of the treatment. UPDRS 2 and UPDRS 3 were assessed before and after treatment. It has been shown to be valid and reliable tool of measurement. Group A was given relaxation exercises, ROM exercises, stretching techniques, posture maintaining exercises and gait training. The Group B received conventional therapy along with PRE.

The results showed that, both groups showed improvement in ADL and Motor Performance. Group A and Group B showed improvement in UPDRS 2 ADL and UPDRS 3 Motor Examination. Even though both groups showed improvement, Group B improved more improvement in UPDRS 2 and UDRS 3 than in Group A. It indicates that PRE is effective to improve ADL and Motor Performance in IPD patients.

According to Daniel M Corcos et al (2014) PRE causes repetitively generating large forces which thereby increase the neuronal activation in basal ganglia circuits' more than small forces[22]. That may be one of the reason for improving motor performance and ADL in IPD.

Spraker MB et al (2009) suggests that the Blood Oxygen Level Dependent (BOLD) signal increases in specific basal ganglia nuclei, ventral thalamus and motor cortex with repetitive force generation thereby leading to corticomotor excitability[22]. This may also contribute for improving motor performance and ADL in IPD.

Research suggests that PRE can increase dopamine level and metabolism, which subsequently increase functional independence in PD subjects (Sasco AJ, 2010).

Researches done by Comella CL et al states that PRE lead to experience – dependent plasticity in basal ganglia and cortcomotor pathways, which contribute to improving Parkinsonian signs and enhancing motor performance[23].

According to Lif Harmer et al PRE has also been shown to reduce falls which are major concern in treatment of PD[25]. Lima et al (2013) found that PRE was designed to continuously challenge the patients, and they may have found this rewarding and motivating. This can be the reasons for improvements in ADL.

Thus we can conclude that PRE have an important role in improving Motor Performance and Activities of Daily Living in Idiopathic Parkinson's Disease in stage 2, 2.5, and 3 of Modified Hoehn and Yahr Scale.

LIMITAIONS

- Smaller Sample size.
- Only Idiopathic PD were included.
- Only patients with mild to moderate disease severity were included.
- Only short term effects being evaluated (No follow Up after 4 weeks).

SUGGESTIONS

Further studies can be done

- To find out the effect of PRE in improving quality of life.
- Single blinded study can be conducted.
- Selection of larger sample size.
- Must include all stages from modified Hoehn and Yahr scale.
- To examine whether these effects are maintained for longer duration.

CONCLUSION

CONCLUSION

The study tried to analyze the effects of PRE along with conventional therapy on Motor Performance and Activities of Daily Living in IPD patients.

Statistical analysis of UPDRS 2 ADL and UPDRS 3 Motor Examination recommends that PRE along with Conventional therapy has significant effect in patients with IPD than Conventional therapy alone. Hence this study reveals that PRE enhances Motor performance and Activities of Daily Living in patients with IPD.

Hence we conclude that, PRE along with conventional therapy is effective in improving motor performance and ADL in patients with IPD.

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ANNEXURES

PERFORMA FOR IPD

DEMOGRAPHIC DATA

Name :

Age :

Sex :

Occupation :

Date of Admission :

Date of Assessment:

IP No :

Dominance :

Address :

SUBJECTIVE ASSESSMENT

Chief complaints :

Present medical history :

Past medical history :

Family history :

Surgical history :

Socio economic status :

Drug history :

Occupational history :

Life style history :

Psychological status :

VITAL SIGNS

Temperature :

Pulse rate :

BP :

Resp Rate :

OBJECTIVE ASSESSMENT

ON OBSERVATION

Built of patient :

Gait :

Atrophy :

Colour of skin :

Contour :

External Appliances :

Face :

ON PALPATION:

Tone :

Oedema :

Warmth :

ON EXAMINATION

HIGHER FUNCTION

Level of Consciousness (Glasgow Coma Scale) :

Orientation :

Attention :

Communication :

Perception :

CRANIAL NERVE EXAMUNATIONS

Right	Left
I – XII Cranial Nerves	

MOTOR EXAMINATION

UPPER EXTREMITIES

Features	**Right**	**Left**
Power		
Tone		
Atrophy		
Fasciculations		
Involuntary movements		

LOWER EXTREMITIES

Features	**Right**	**Left**
Power		
Tone		
Atrophy		
Fasciculations		
Involuntary movements		

CO-ORDINATION ASSESSMENT

Finger to nose, Heel to knee.		
Dysdiodochokinesis, Dyssynergia/dyssymetria		
Postural/Intention/Resting Tremors		
Drawing Circles		
Rebound phenomenon		
Pendular muscle stretch response		

SENSORY EXAMINATION

Pin Prick	Light Touch
Warm/Cold	Vibration
Position Sense	Stereognosis
Graphesthesia	Tactile Localization
Two Point Discrimination	Double simultaneous stimulation
Recognition of texture	Barognosis

REFLEX INTEGRITY

	Right	Left		R	L
Biceps			**CUTANEOUS REFLEXES**		
Triceps			Abdominal		
Radial			Upper		
Knee			Lower		
Ankle			Cremasteric		
Hoffman			Hoffmastic		
Clonus			Plantar		

DISEASE SPECIFIC SCALE – UPDRS

UPDRS 2 (Activities of daily Living)

UPDRS 3 (Motor Examination)

INVESTIGATIONS:

Continued observation of clinical signs and symptoms

MRI

DIFFERENTIAL DIAGNOSIS:

PROVISIONAL DIAGNOSIS:

PT Management

Aims :

Means :

UNIFIED PARKINSON'S DISEASE RATING SCALE (UPDRS – 2 ADL)

ACTIVITIES OF DAILY LIVING (for both "on" and "off")

1. Speech

0 = Normal.
1 = Mildly affected. No difficulty being understood.
2 = Moderately affected. Sometimes asked to repeat statements.
3 = Severely affected. Frequently asked to repeat statements
4 = Unintelligible most of the time.

2. Salivation

0 = Normal
1 = Slight but definite excess of saliva in mouth; may have night time drooling.
2 = Moderately excessive saliva; may have minimal drooling.
3 = Marked excess of saliva with some drooling.
4 = Marked drooling, requires constant tissue or handkerchief.

3. Swallowing:

0 = Normal
1 = Rare choking
2 = Occasional choking
3 = Requires soft food
4 = Requires NG tube or gastrotomy feeding.

4. Handwriting:

0 = Normal
1 = Slightly slow or small
2 = Moderately slow or small; all words are legible.
3 = Severely affected; not all words are legible.
4 = The majority of words are not legible.

5. Cutting food and handling utensils:

0 = Normal
1 = Some what slow and clumsy, but no help needed.
2 = Can cut most foods, although clumsy and slow; some help needed.
3 = Food must be cut by someone, but can still feed slowly.
4 = Needs to be fed.

6. Dressing

0 = Normal
1 = Some what slow, but no help needed
2 = Occasional assistance with buttoning, getting arms in sleeves.
3 = Considerable help required, but can do some things alone.
4 = Helpless.

7. Hygiene

0 = Normal
1 = Some what slow, but no help needed.
2 = Needs help to shower or bathe; or very slow in hygienic care.
3 = Requires assistance for washing, brushing teeth, combing hair, going to bathroom
4 = Foley catheter or other mechanical aids

8. Turning in bed and adjusting bed clothes

0 = Normal
1 = Some what slow and clumsy, but no help needed
2 = Can turn alone or adjust sheets, but with great difficulty.
3 = Can initiate, but not turn or adjust sheets alone
4 = Helpless

9. Falling (unrelated to freezing)

0 = None
1 = Rare falling
2 = Occasionally falls, less than once per day
3 = Falls an average of once daily
4 = Falls more than once daily

10. Freezing when walking

0 = None
1 = Rare freezing when walking; may have start hesitation
2 = Occasional freezing when walking
3 = Frequent freezing. Occasionally falls from freezing
4 = Frequent falls from freezing

11. Walking

0 = Normal
1 = Mild difficulty. May not swing arms or may tend to drag leg

2 = Moderate difficulty, but requires little or no assistance
3 = Severe disturbance of walking, requiring assistance
4 = Cannot walk at all, even with assistance

12. Tremor (Symptomatic complaint of tremor in any part of body)

0 = Absent
1 = Slight and infrequently present
2 = Moderate; bothersome to patient
3 = Severe; interferes with many activities
4 = Marked; interferes with most activities.

13. Sensory complaints related to parkinsonism

0 = None
1 = Occasionally has numbness, tingling, or mild aching
2 = Frequently has numbness, tingling, or aching; not distressing
3 = Frequent painful sensations
4 = Excruciating pain

UNIFIED PARKINSON'S DISEASE RATING SCALE (UPDRS – 3 MOTOR EXAMINATION)

MOTOR EXAMINATION

1. Speech

0 = Normal
1 = Slight loss of expression, diction and /or volume
2 = Monotone, slurred but understandable; moderately impaired
3 = Marked impairment, difficult to understand

2.Facial Expression

0 = Normal
1 = Minimal hypomania, could be normal "Poker Face"
2 = Slight but definitely abnormal diminution of facial expression
3 = Moderate hypomania; lips parted some of the time
4 = Masked or fixed faces with severe or complete loss of facial expression; lips parted 1/4 inch or more.

3. Tremor at rest

0 = Absent
1 = slight and infrequently present
2 = Mild in amplitude and persistent or moderate in amplitude, but only intermittently present.
3 = Moderate in amplitude and present most of the time.
4 = Marked in amplitude and present most of the time

4. Action or Postural Tremor of hands

0 = Absent
1 = Slight; present with action
2 = Moderate in amplitude, present with action.
3 = Moderate in amplitude with posture holding as well as action
4 = Marked in amplitude; interferes with feeding

5. Rigidity (Judged on passive movement of major joints with patient relaxed in sitting position Cogwheeling to be ignored)

0 = Absent
1 = Slight or detectable only when activated by mirror or other movements

2 = Mild to moderate
3 = Marked, but full range of motion easily achieved
4 = Severe, range of motion achieved with difficulty

6. Finger taps (Patient taps thumb with index finger in rapid succession with widest amplitude possible, each hand separately)

0 = Normal
1 = Mild slowing and/or reduction in amplitude
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement
4 = Can barely perform the task.

7. Hand Movements
0 = Normal
1 = Mild slowing and/or reduction in amplitude.
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement
4 = Can barely perform the task.

8. Rapid Alternating Movements of Hands (Pronation – supination movements of hands, vertically and horizontally, with as large an amplitude as possible, both hands simultaneously)

0 = Normal
1 = Mild slowing and/or reduction in amplitude
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement
4 = Can barely perform the task.

9. Foot Agility (Patient taps heel on the ground in rapid succession picking up entire leg. Amplitude should be at least 3 inches)

0 = Normal
1 = Mild slowing and/or reduction in amplitude
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement

3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement
4 = Can barely perform the task.

10. Arising from Chair (Patient attempts to rise from a straight backed chair, with arms folded across chest)

0 = Normal
1 = Slow; or may need more than one attempt
2 = Pushes self up from arms of seat
3 = Tends to fall back and may have to try more than one time, but can get up without help.
4 = Unable to arise without help

11. Posture

0 = Normal erect
1 = Not quite erect, slightly stooped posture; could be normal for older person
2 = Moderately stooped posture, definitely abnormal; can be slightly leaning to one side.
3 = Severely stooped posture with kyphosis; can be moderately leaning to one side
4 = Marked flexion with extreme abnormality of posture

12. Gait

0 = Normal
1 = Walks slowly, may shuffle with short steps, but no festinating (hastening steps) or propulsion.
2 = Walks with difficulty, but requires little or no assistance; may have some festination, short steps, or propulsion.
3 = Severe disturbance of gait, requiring assistance
4 = Cannot walk at all, even with assistance

13. Postural Stability (Response to sudden, strong posterior displacement produced by pull on shoulders while patient erect with eyes open and feet slightly apart. Patient is prepared)

0 = Normal
1 = Retropulsion, but recovers unaided
2 = Absense of postural response; would fall if not caught by examiner
3 = Very unstable, tends to lose balance spontaneously
4 = Unable to stand without assistance.

14. Body Bradykinesia and Hypokinesia (Combining slowness, hesitance, decreased arm swing, small amplitude, and poverty of movement in general)

0 = None
1 = Minimal slowness, giving movement a deliberate character; could be normal for some persons. Possibly reduced amplitude
2 = Mild degree of slowness and poverty of movement that is definitely abnormal. Alternatively some reduced amplitude.
3 = Moderate slowness, poverty or small amplitude of movement
4 = Marked slowness, poverty or small amplitude of movement

CONSENT FORM

I ..... voluntarily consent to participate in the research study name " EFFECT OF PROGRESSIVE RESISTANCE EXERCISE IN IMPROVING MOTOR PERFORMANCE AND ACTIVITIES OF DAILY LIVING IN MILD TO MODERATE PARKINSON'S DISEASE".

The researcher has explained me the treatment approach in detail, risk of participation, and had answered the questions related to the research to my satisfactory. I had also given the opportunity to withdraw from the study at any time.

PARTICIPANT NAME :

DATE :

SIGNATURE :

DATA COLLECTION SHEET

PATIENT NAME :

IP/OP NO :

DATE :

GENDER :

AGE :

DURATION OF CONDITION :

BLOOD PRESSURE :

HEART RATE :

ACTIVITIES OF DAILY LIVING (UPDRS 2) :

BEFORE TEST :

AFTER TEST :

MOTOR EXAMINATION (UPDRS 3) :

BEFORE TEST :

AFTER TEST :

EXERCISE CHECKLISH

	1st WEEK	2nd WEEK	3rd WEEK	4th WEEK
MONDAY				
TUESDAY				
WEDNESDAY				
THURSDAY				
FRIDAY				
SATURDAY				
SUNDAY				

LIST OF ABBREVIATIONS USED

ADL - ACTIVITIES OF DAILY LIVING

IPD - IDIOPATHIC PARKINSON'S DISEASE

PD - PARKINSON'S DISEASE

PRE - PROGRESSIVE RESISTANCE EXERCISE

RM - REPETITION MAXIMUM

UPDRS – UNIFIED PARKINSONS DISEASE RATING SCALE