

**EFFECTIVENESS OF PNF TECHNIQUES ON DIAPHRAGMATIC
MUSCLE ACTIVITY IN THE MANAGEMENT OF SELECTED
OUTCOME VARIABLES AMONG PARKINSONS PATIENTS**

A dissertation submitted in partial fulfillment of the requirement for the degree of

**MASTERS OF PHYSIOTHERAPY
(ELECTIVE- PHYSIOTHERAPY IN NEUROLOGY)**

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R.V.S. College of Physiotherapy

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INTERNAL EXAMINER

EXTERNAL EXAMINER

A dissertation submitted in partial fulfillment of the requirement for the degree of
Masters of Physiotherapy–May 2018 to The Tamil Nadu Dr. M.G.R. medical
university, Chennai.

CERTIFICATE

Certified that this is the bonafide work of Mrs.NV.Varthini of R.V.S. College of Physiotherapy, Sulur, Coimbatore submitted in partial fulfillment of the requirements for the Masters of Physiotherapy Degree course from The Tamil Nadu Dr. M.G.R Medical University under the Registration No: 271620025.

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NV.Varthini

DECLARATION

I hereby declare and present my project work **“EFFECTIVENESS OF PNF TECHNIQUES ON DIAPHRAGMATIC MUSCLE ACTIVITY IN THE MANAGEMENT OF SELECTED OUTCOME VARIABLES AMONG PARKINSONS PATIENTS”**. The outcome of original research work under taken and carried out by me under the guidance of **Dr.M.K Franklin Shaju, M.P.T.,PhD**, Professor, R.V.S. College of Physiotherapy, Sulur, Coimbatore, Tamilnadu.

I also declare that the material of this projects has not formed in anyway the basis for the award of any other degree previously from The Tamil Nadu Dr. M.G.R. Medical University, Chennai.

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I INTRODUCTION

James Parkinson first described Parkinson's disease (PD) extensively in 1817. It is a chronic progressive disorder of the central nervous system that belongs to a group of conditions called motor system disorders. Direct result of the loss of cells in a section of the brain called the substantia nigra; those cells produce dopamine which is a chemical messenger responsible for transmitting signals with the brain and loss of dopamine causes neurons in the brain to fire out of control leaving the person unable to control their movements in a normal manner (Samii, 2004).

It is estimated approximately 6.3 million people suffer from parkinson's disease worldwide, among hospital based series of 2, 43, 02 new patient, 27% had neurological disorder of which 20% had movement disorder (Das1996).

WHO gives an estimated increase of 16-19 per lakh. It affects approximately 1% of individuals older than 60 years. Out of world's 580 million elderly 60% live in developing countries and 22% live in India. 80% of elderly Indians live in rural areas, 73% are illiterate, 60% are women and 60% live below the poverty line (India, China, Pakistan & Japan). The number of PD patients in these countries is expected to increase from 2.57% million to 6.17 million in 2030 (Muthane 2007).

PD is characterized by motor symptoms including bradykinesia, hypokinesia, rigidity and tremor problems with gait start to occur in early stages of the disease characteristic impairments include an asymmetrically reduced or absent arm swing a stopped posture an asymmetrical step size and difficulties. turning around in the standing or recumbent positions, as the disease progresses, the gait patterns becomes slower and the typical parkinsonian gait develops with shuffling and short steps and impaired motor control (Ebersbach *et al.*, 2015).

Fatigue is a common problem for the people with parkinson's disease (PD) its pathophysiological mechanism remains unclear, Fatigue in PD can be defined as an unpleasant sensation of lacking energy, making the performance of routine activities, physical or mental strain (Joseph 2006).

A combined approach of physical therapy and pharmacological intervention plays a key role in the management of the patients with parkinson's disease. For most patients physical therapy is not prescribed until the disease has progressed to the point when a function has declined. A variety of interventions are used to achieve goals and outcomes including direct interventions, supervision of assistive personnel, patient or family caregiver instructions environmental modification and supportive counseling. Early intervention is critical in preventing the devastating. Musculoskeletal impairments these patients are so prone to develop. Interventions also focus on improvement of motor functions exercise capacity, functional performance and activity participation. Education of parents, family members care gives is critical to obtaining outcomes (Turnbull 1992).

Pharmacological attempts to restore dopaminergic activity with levodopa and dopamine agonists have been successful in activating many of the clinical features of PD. An alternative but complementary approach has been to restore the normal activities of daily living of cholinergic and dopaminergic influences on the basal ganglia with anticholinergic drugs (Lang 1998).

Surgical treatments there are three major ablative procedure, thalamotomy, pallidotomy and deep brain stimulation (Follet 2000).

Physical therapy is to influence the disease process itself but can improve daily functioning by training the patient in the use of movement strategies, secondary health problems .e.g.(risk of) decreased strength endurance and core areas of physical therapy.

Transfer turning in the bed and rising from a chair. Posture (including neck and back problem) reaching and grasping, activities of daily living and falls, gait and physical capacity and in activity (Garrett 2004)

Endurance exercise is beneficial in people with parkinson's disease. This will increase heart rate and produces factors that prevent brain cell death (Quincy 1999).

PNF is a new technique to improve the respiratory function such as tidal volume Inspiratory reserve volume expiratory reserve volume, inspiratory capacity and vital capacity improve strength and endurance of respiratory muscles (Mancks *et al.*, 2005).

1.1 Statement of the study

A comparative study on the effectiveness of PNF techniques on diaphragm and conventional physiotherapy in the management of endurance and functional abilities among parkinson's patient.

1.2 Need of the study

WHO gives an estimated incidence of 16-19 per lakh, it affects approximately 1 % of individuals older than 60 years. Out of world's 580 million peoples are affected 22% live in India. The need of the study is to validate and compare the effectiveness of PNF techniques on diaphragm and conventional physiotherapy in the management of endurance and functional abilities among parkinson's patients.

1.3 Objectives of the study

- To find out of the effectiveness of PNF techniques on diaphragm in the management of endurance among parkinson's patients.
- To find out of the effectiveness of conventional physiotherapy in the management of endurance among parkinson's patients.

- To compare the effects of PNF techniques on diaphragm and conventional physiotherapy in the management of endurance among parkinson's patients.
- To find out of the effectiveness of PNF techniques on diaphragm in the management of functional abilities among parkinson's patients.
- To find out of the effectiveness of conventional physiotherapy in the management of functional abilities among parkinson's patients.
- To compare the effects of PNF techniques on diaphragm and conventional physiotherapy in the management of functional abilities among parkinson's patients.

1.4 Hypothesis

1. It is hypothesized there is no significant difference in endurance and functional abilities following PNF techniques on diaphragm among parkinson's patients.
2. It is hypothesized there is no significant difference in endurance and functional abilities following conventional physiotherapy among parkinson's patients.
3. It is hypothesized there is significant difference between PNF techniques on diaphragm and conventional physiotherapy in the management of endurance and functional abilities among parkinson's patients.

1.5 Operational definition

- **Parkinson's disease**

Parkinson's disease is a progressive disorder of central nervous system with both motor and non motor symptoms. Motor symptom includes the cardinal features of rigidity, bradykinesia, and tremor and in later stages postural instability. Non motor symptoms may precede the onset of motor symptoms by years (Susan 2014).

- **Proprioceptive Neuromuscular Facilitation (PNF)**

PNF is an approach to therapeutic exercise based on the principles of functional human anatomy or neurophysiology and it uses proprioceptive, cutaneous and auditory input to produce functional improvement in motor output and these techniques to increasing strength flexibility and range of motion (Reza 2010).

- **Endurance**

Prolonged training at relatively low intensity, aimed at enhancement of the exercised muscles (Frontera 2006).

- **Conventional Physiotherapy**

Conventional physiotherapy treatments that are widely accepted and practiced by the main stream medical community (Alexander 1997).

- **Self Parkinson's disease Disability Scale**

Parkinson's disease specific questionnaire that consists of 24 items that address individual performance of activities of day living (Jahanashi *et al.*, 1989).

- **Six minute walk test**

Six minute walk test measures the exercise capacity of patients and provides information regarding the endurance capacity (Rasekaba2009).

- **PNF on Diaphragm**

PNF of respiratory muscles is the term used to describe externally applied proprioceptive and tactile stimulus that produces reflex respiratory movement (Anandhi 2017).

II REVIEW OF LITERATURE

Sections A: Studies on general aspects of Parkinson's disease

Section B: Studies on effect of PNF diaphragmatic breathing in Parkinson's patients

Section C: Studies on effect of conventional physiotherapy in Parkinson's patients

Section D: Studies on reliability and validity of 6 mint walk test.

Section E: Studies on reliability and validity of self assessment Parkinson's disease disability scale (SPDDS)

Sections A: Studies on general aspects of Parkinson's disease

Morris *et al.*, (2010) states that Parkinson's disease is common throughout the world, the evidence for endurance exercise training in improving oxygen consumption is still emerging. They conducted a study on 44 patients with parkinson's disease given 12 weeks treatment of endurance exercise training and home programme was effective in improving oxygen consumption.

Jorina *et al.*, (2013) did a study with three patients with mild to moderate PD (all males, aged 52, 54, 70 years) Hoehn & yahr stages 1 –III completed a four week Lee Silverman voice treatment Big (LSVT BIG) training program (16 individual 1 hour sessions) and intensive home training programme and suggested that the LSVT Big may be beneficial for the activities of daily living, gait and bed mobility.

Kazuo *et al.*, (2000) evaluated fatigue in 26 patient's clinically diagnosed in parkinson's patients (16 men, 10 women) and age and sex matched 26 controls (16 men, 10 women) without neurological deficits by using fatigue scale. In addition to neurological and neuropsychological examinations, all patients underwent MRI and SPECT using 99mTc-HMPAO and patients with PD had normal cognitive function as

judged by the MMSE, but significantly high scores with the fatigue and depression scales in comparison to controls ($p=0.05$) and concluded that sense of fatigue in patients with PD might be associated with frontal lobe dysfunction.

Section B: Studies on effect of PNF diaphragmatic breathing in Parkinson's patients

Paul *et al.*, (2017) did a randomized controlled pilot trial to evaluate addition of PNF of respiration to pursed lip breathing exercise compared to effects of pursed lip breathing exercise alone in the management of COPD with 14 subjects (19 males, 5 females age group 40 – 60 years) and subjects were randomly allocated to receive either PNF of respiration and pursed lip breathing exercise (Group A) or pursed lip breathing exercise alone (Group B). outcome measures were distance covered in the six minute walk distance test and Modified Rate of Perceived Exertion(MRPE) during the 6 minute walk test. Between the group analysis showed that the results of Group A was statistically more significant than Group B for both the outcome measures(distance covered in 6 minute walk test(t value-13.62, p value<0.001).and MRPE(t value-2.95, p value<0.01).Hence, this study concluded that the PNF of respiration was more effective, improving exercise capacity in patients with COPD.

Vidhyadhari (2015) studied influence of PNF technique on diaphragm muscle activity and on pulmonary function in subjects with guillain- barre syndrome. 30 subjects who met inclusive criteria were selected by random sampling method and divided in to experimental and control group.(15 in each group).diaphragm muscle activity is measured by surface EMG biofeedback; and concluded that pulmonary function (FEV/FVC) is measured with portable electronic spirometer. These parameters were assessed before intervention and on the seventh day after intervention. The group treated with proprioceptive neuromuscular facilitation techniques (Rhythmic stabilization,

repeated contractions) and breathing exercise had significant improvement on diaphragm muscle function measured in mille seconds and FEV/FVC compared to group treated without proprioceptive neuromuscular facilitation techniques. PNF technique and breathing exercise had significant improvement on diaphragm muscle functions.

Anandhi (2017) stated that proprioceptive neuromuscular facilitation is a new technique to improve the respiratory function to find out the immediate effect of PNF of respiratory muscles on pulmonary function in collegiate students. A quasi experimental study with one group pre test post test design was done. A sample of 30 sample including both men and women, with an age group between (18-28 years), Asian BMI 17.5-27.99 (underweight to over weight) were selected. Subjects who were obese, smokers, lung disease, cardiac disease, congenital chest deformities, who had recent surgeries in chest wall, subjects on any physical training programs were excluded. Outcome measures were pulmonary function Test- Tidal Volume, Inspiratory Reserve Volume, Expiratory Reserve Volume, Inspiratory Capacity, Vital capacity which were taken before 5 minute after giving PNF technique. Forced Vital capacity (FVC) showed significant increase of mean difference of 2.5434 with $p < 0.05$ and Inspiratory Capacity(IC) also showed significant increase of mean difference of 0.266 with $p < 0.05$ after giving PNF. And PNF technique improved respiratory muscle function.

Section C: Studies on effect of conventional physiotherapy in Parkinson's patients.

Claire *et al.*, (2013) studied the role of physiotherapy is to maximize the functional ability and minimize secondary complications through movement rehabilitation aim is to improve quality of life by exercise, gait training cueing, dance or martial arts and the treatment was effective.

Danique *et al.*, (2017) did a study on care of people and physical therapy to support with Parkinson's disease with consequences of their daily activities exercise or planned and repetitive physical activity first main focus on physical capacity, functional ability, core elements including activities of daily living transfer and gait second exercise works on symptomatic treatment suppression of motor symptoms third exercise also improves non motor symptoms such as depression apathy fatigue and cognitive elements, physical therapy inventions are good.

Samyra *et al.*, (2007) studied the importance of physical therapy for Parkinson's disease in every day practice can improve daily functioning by teaching and training six specific core areas for physical therapy were identified transfer (e.g. turning in bed or rising from a chair) posture (including neck and back problems) reaching and grasping activities of daily living and falls gait physical capacity and (in) activity and it was effective in parkinson's patient.

Section D: Studies on reliability and validity of 6 mint walk test.

Susan *et al.*, (2017) assessed the reliability and validity of four clinical gait measures, the Timed Up and Go (TUG) test, the Dynamic Gait Index (DGI), the 2-Minute Walk Test (2MWT), and the 6-Minute Walk Test (6MWT). Patient self-report of gait was also assessed using the 12-item Multiple Sclerosis Walking Scale (MSWS-12). Individuals 20 years or older with a diagnosis of multiple sclerosis (MS) and an EDSS score of 2.0 to 6.5 completed the MSWS-12, T25FW test, TUG test, DGI, 2MWT, and 6MWT were selected as subjects. All the tests were repeated 2 weeks later at the same time of day to establish their reliability and concurrent validity. Predictive validity was established using the EDSS. Forty-two patients with MS were included. All measures showed high test-retest reliability. The TUG test, 2MWT, and 6MWT were significantly correlated with the T25FW test (Spearman $\rho = -0.902, -0.919, \text{ and } -0.905,$

respectively). The EDSS was also significantly correlated with all the walking tests. The MSWS-12 demonstrated the highest correlation to the EDSS ($\rho = 0.788$). The researchers concluded that the TUG test, the DGI, the 2MWT, and the 6MWT exhibited strong psychometric properties and were found to be significant predictors of the EDSS score. Use of these tests to prospectively monitor the effects of medical and rehabilitation treatment should be considered in the comprehensive care of patients with MS.

Teresa *et al.*, (2002) did a study to provide data for 4 common clinical tests in a sample of community-dwelling older adults. Ninety-six community-dwelling elderly people (61–89 years of age) with independent functioning performed 4 clinical tests. Data were collected on the Six-Minute Walk Test (6MW), Berg Activities of daily living Scale (BBS), and Timed Up & Go Test (TUG) and during comfortable- and fast-speed walking (CGS and FGS). Intraclass correlation coefficients (ICCs) were used to determine the test-retest reliability for the 6MW, TUG, CGS, and FGS measurements. Data were analyzed by gender and age (60–69, 70–79, and 80–89 years) cohorts, similar to previous studies. Means, standard deviations, and 95% confidence intervals for each measurement were calculated for each cohort. The 6MW, TUG, CGS, and FGS measurements showed high test-retest reliability (ICC [2,1]=.95–.97). Mean test scores showed a trend of age-related declines for the 6MW, BBS, TUG, CGS, and FGS for both male and female subjects. Preliminary descriptive data suggest that physical therapists should use age-related data when interpreting patient data obtained for the 6MW, BBS, TUG, CGS and FGS. Further data on these clinical tests with larger sample sizes are needed to serve as a reference for patient comparisons.

Roberta and Jessie (1998) did a study to assess the reliability and validity of a 6-min walk test as a measure of physical endurance in older adults. Seventy-seven subjects,

ages 60-87. performed three separate 6-min walk tests and a treadmill test and completed questionnaire items assessing physical activity level and functional status. The 6-min walk had good test-retest reliability ($.88 < R < .94$), particularly when a practice trial preceded the test trial. Convergent validity of the 6-min walk was demonstrated by its moderate correlation ($.71 < r < .82$) with treadmill performance. Construct validity was assessed by determining the ability of the test to detect differences between different age and activity level groups. As expected, walking scores decreased significantly across decades and were significantly lower for low-active subjects compared to high-active subjects. There was a moderate relationship between 6-min walk scores and self-reported functional ability. It was concluded that the 6-min walk can be used to obtain reasonably reliable and valid measures of physical endurance in older adults and that it moderately reflects overall physical functional performance.

Section E: Studies on reliability and validity of self assessment Parkinson's disease disability scale (SPDDS)

Gazibara *et al.*, (2013) did a study to assess the validity and reliability self assessment disability scale with parkinson's patient were ability to walk 10 minutes independently with 25 items questionnaire to measure day living activities.

Geriatr and Gazibara (2015) studied the reliability and validity of self assessment scale for fall frequency risk factor PD with 300 subjects are conducted and self assessment was protective and effective.

Biemans *et al.*, (2001) did a study to test the consistency and validity of the Self-Assessment Parkinson's Disease Disability Scale in patients with parkinson's disease living at home. Patients with parkinson's disease responded to a set of questionnaires. In addition, an observation of the performance of daily activities was carried out on a subgroup. Patients with parkinson's disease living at home ($n = 142$) were taken for

study. The Self-assessment Parkinson's Disease Disability Scale (SPDDS), the Hoehn & Yahr Rating Scale (H&Y), and the Sickness Impact Profile (SIP68) were taken as tool. The observation concerned nine activities that correspond to items of the SPDDS questionnaire. The results of the study shows that Internal consistency of the SPDDS was very high (Cronbach's alpha = 0.97; reliability rho = 0.97). The items of the SPDDS are hierarchical (Loevinger's H = 0.64): patients had least difficulty with 'washing' and 'brushing teeth' and most difficulty with 'turning in bed', 'travelling by public transport' and 'writing a letter'. Validity of the SPDDS was good: the relationship between the SPDDS questionnaire and the H&Y rating scale, the SIP68 and the results of the observation was strong and significant. Finally the researchers concluded that SPDDS is a unidimensional instrument measuring disabilities in parkinson's disease patients living at home.

III METHODOLOGY

3.1 Study setting

The study was conducted in outpatient department of RVS College of Physiotherapy, Sulur, Coimbatore.

3.2 Selection of subjects

Twenty subjects were selected who fulfilled the inclusion and exclusion criteria and were consecutively assigned into two equal groups.

Group A-PNF Techniques on Diaphragm

Group B-Conventional Physiotherapy

3.3 Variables

3.3.1 Dependent variables

- Endurance
- Activities of daily living

3.3.2 Independent variables

- PNF Techniques on Diaphragm
- Conventional Physiotherapy

3.4 Measurement tool

Variable	Tool
Endurance	6 minute walk test
Activities of daily living	Self-assessment parkinson's disease disability scale

3.5 Study design

Pre and post test experimental study design.

3.6 Inclusion criteria

- Clinically diagnosed parkinson's patients.
- Ability to walk without any physical assistance.
- Patient should be capable of walking to cover particular distance after which deterioration will be observed.
- Stable pharmacological treatment.
- Age group between 50 to 60 years.

3.7 Exclusion criteria

- Deep brain stimulation or other stereotactic neurosurgery done patients.
- Postural hypotension.
- Conditions interfering with endurance training: Unstable angina.
- Cardiomyopathy, Uncontrolled metabolic disease etc.

3.8 Orientation to subjects

Before the collection of the data and treatment, subjects were explained the purpose of the study and procedure to be applied. The investigator have given a detailed orientation to the various test procedures such as six minute walk test and self-assessment parkinson's disease disability scale to measure endurance and functional ability respectively.

3.9 Test administration

Six minute walk test:

The patients were made to walk 6 minute as fast as possible, without jogging or running. At the end of six minutes the distance covered by the patient was recorded for analysis.

The test was be administrated in the outdoors on a track. After completion of the task cool down exercises were given to the patients.

Self-assessment parkinson's disease disability scale

The SPDDS is a disease-specific questionnaire consisting of 24 items addressing activities of daily living. The patient indicates to what extent they are able to perform the activities without help. Answers are rated on a five-point scale ranging from 'able to do alone without difficulty' to 'unable to do at all'. The patients were asked to perform the 24 task individually and mark the questionnaire based on the ability.

3.10 Treatment procedure

Twenty parkinson's subjects were selected based on the criteria and divided into two equal groups. Group A subjects were given PNF diaphragm training and group B conventional physiotherapy. General precautions were advised to both the groups, they are, when the patients feel short of breathe during exercise or regular activities, they were instructed to stop the activity. Reset by sitting down, relax the shoulders, and do pursed-lip breathing until they can catch breathes.

PNF diaphragm training

Patient position: Supine without pillow.

Therapist position: Stride standing position with hands placed on the lateral surface of both the sides on the ribs.

Procedure: The therapist instructed the patient to take deep breath. When the subject's ribs move upward and laterally, the therapist assisted the movements of the subjects ribs to promote the subjects respiratory pattern. At the time of maximum inspiration patients were asked to hold the breath for 5 seconds, and the therapist dorsomedially applied soft manual resistance to the lower rib regions on both sides. When subjects breath out, the therapist asked to, "Breath out maximally". At this time the subjects ribs moved downward and medially. At maximum expiration the therapist pushed the lower rib region on both sides upward while gathering the regions dorsomedially and therapist shook the region to assist with the discharge of the air remaining in the lungs.

Training details:

Duration: 4 weeks

Session: 1 session / day

Repetitions: 3 sets / session

Duration of one session: 30 minutes



Figure 1: PNF diaphragmatic breathing exercises

Conventional physiotherapy

S.No	Exercises	Description	Duration
1.	Mat activities	Activities from supine to standing	10 minutes
2.	Strengthening and Flexibility exercises	Specific strengthening exercises with weight cuff and terabands. Specific stretching exercises for tight muscles.	10 minutes
3.	Balancing exercises	Wobble board training, single leg stance and weight shifting exercises.	10 minutes

Training details

Duration: 4 weeks

Session: 1 session / day

Duration of one session: 30 minutes



Figure 2: Single leg stance.

3.11 Collection of data

20 Parkinson's subjects were selected and divided into 2 groups for the study. The group A received PNF diaphragm technique and group B received conventional physiotherapy exercises. Both the experimental groups were given treatment for 4 weeks. Before and after 4 weeks of treatment intervention the endurance and activities of daily living were evaluated and recorded by 6 minute walk test and SPDDS respectively.

3.12 Statistical technique

Collected of data's were analyzed by paired 't' test to find out significance difference between pre and post test value of both groups and further unpaired 't' test was applied to find out difference between group.

IV DATA ANALYSIS AND RESULTS

4.1 Data analysis

This chapter deals with the systematic presentation of the analyzed data followed by the interpretation of the data.

a) Paired 't' test

$$\bar{d} = \frac{\sum d}{n}$$

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n - 1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

Where,

d – Difference between pre test and post test values

$\bar{d} = \frac{\sum d}{n}$ – Mean of difference between pre test and post test values

n – Total number of subjects

s – Standard deviation

b) Un paired t' test

$$S = \sqrt{\frac{\sum(x_1 - \bar{x}_1)^2 + \sum(x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}}$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{S} \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

Where,

S = Standard deviation

n_1 = Number of subjects in Group A

n_2 = Number of subjects in Group B

\bar{x}_1 = Mean of the difference in values between pre-test and post-test in Group-A

\bar{x}_2 = Mean of the difference in values between pre-test and post-test in Group-B

TABLE 1

Comparative mean value, mean difference, standard deviation and paired‘t’ value between pre and post-test values of endurance among Group A.

Measurement	Mean	Mean Difference	Standard Deviation	Paired ‘t’ value
Pre-test	140.6			
		36.4	3.860	29.7*
Post-test	177			

*0.005 level of significance.

In group A for endurance the calculated paired‘t’ value is 29.7 and‘t’ table value is 3.250 at 0.005 level. Since the calculated‘t’ value is more than‘t’ table value, it shows that there is significant difference in endurance following PNF diaphragm technique among parkinson’s patients.

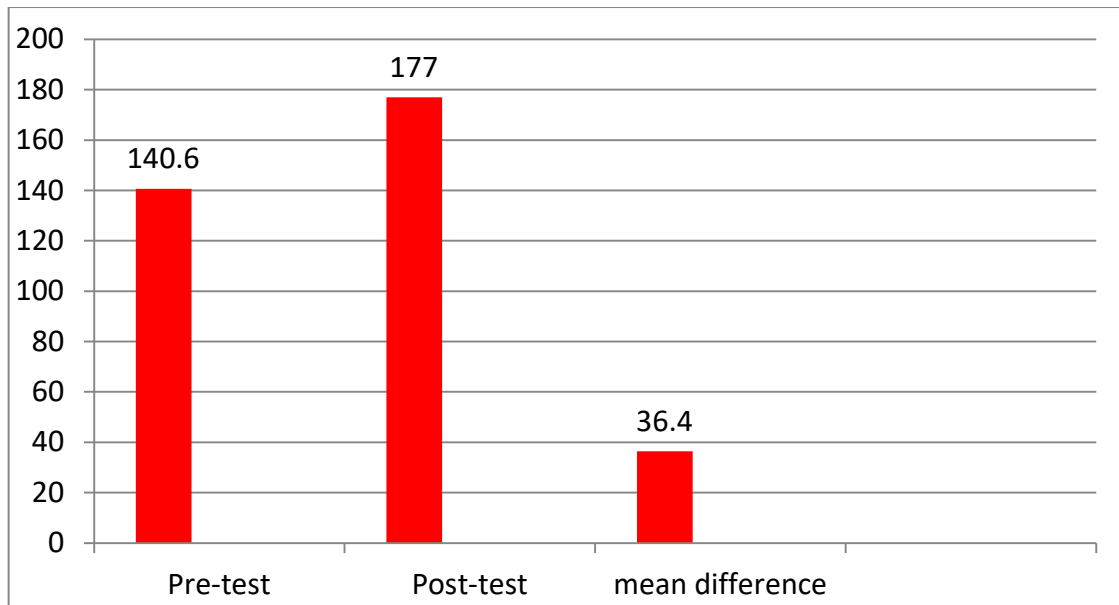


Figure 3: Graphical representation of pre and post-test mean values of endurance in Group A.

TABLE 2

Comparative mean value, mean difference, standard deviation and paired ‘t’ value between pre and post-test values of endurance among Group B.

Measurement	Mean	Mean Difference	Standard Deviation	Paired ‘t’ value
Pre-test	140.6	24.4	7.41	10.4*
Post-test	165			

*0.005 level of significance.

In group B for endurance the calculated paired‘t’ value is 10.4 and‘t’ table value is 3.250 at 0.005 level. Since the calculated‘t’ value is more than‘t’ table value, it shows that there is significant difference in endurance following conventional physiotherapy among parkinson’s patients.

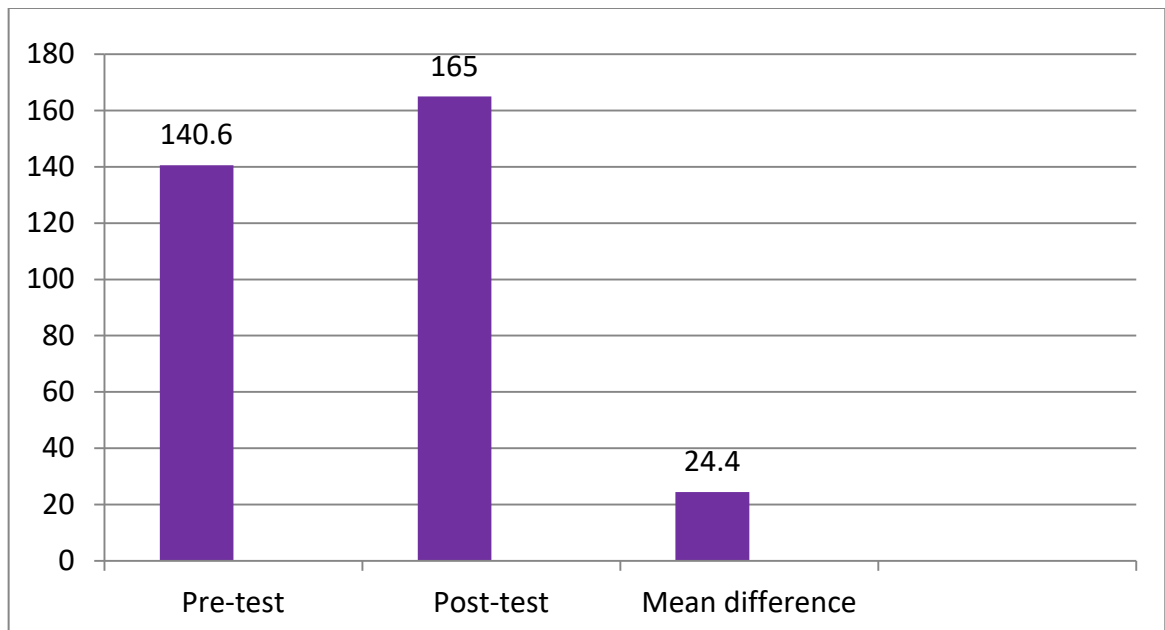


Figure 4: Graphical representation of pre and post-test values of endurance in Group B.

TABLE: 3

Comparative mean value, mean difference, standard deviation and unpaired ‘t’ values of endurance between Group A and Group B.

S.no	Groups	Improvement		Standard deviation	Unpaired “t” Test
		Mean	Mean difference		
1	Group-A	36.4	12	5.91	4.53*
2	Group-B	24.4			

*0.005 level of significance

In group A and B for endurance the calculated unpaired ‘t’ value is 4.53 and ‘t’ table value is 2.87 at 0.005 level. Since the calculated ‘t’ value is more than ‘t’ table value, it shows that there is significant difference between PNF diaphragm technique and conventional physiotherapy exercises in endurance among parkinson’s patients.

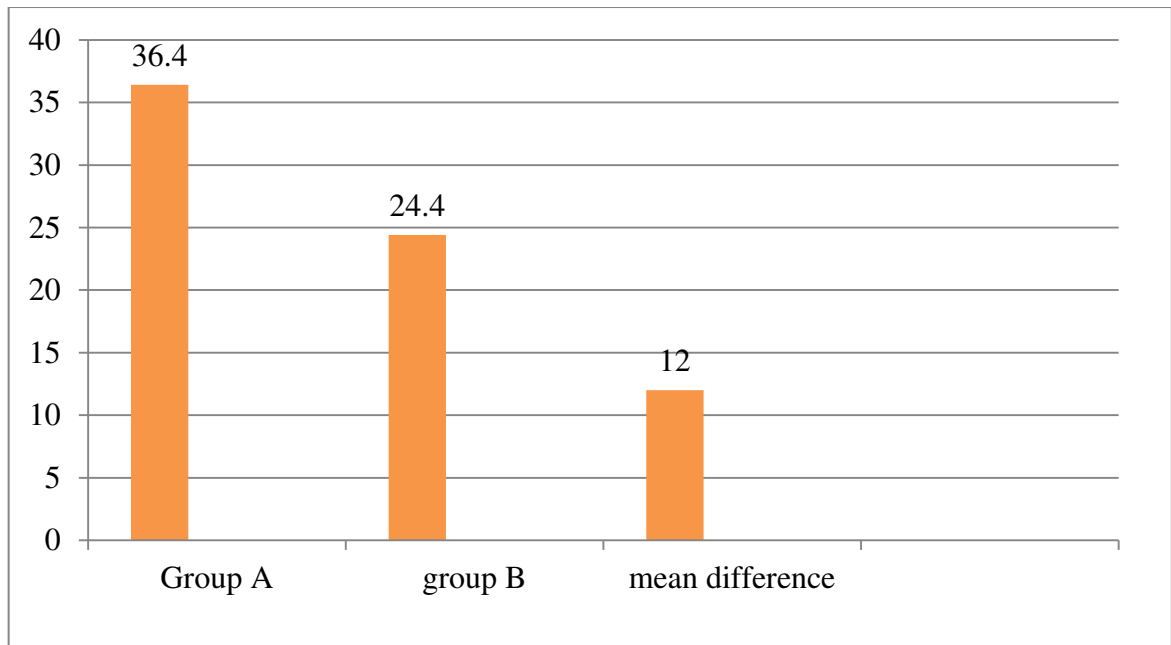


Figure 5: Graphical representation of mean values of endurance in Group A and Group B.

TABLE: 4

Comparative mean value, mean difference, standard deviation and paired ‘t’ value between pre and post-test values of activities of daily living among Group A.

Measurement	Mean	Mean Difference	Standard Deviation	Paired ‘t’ value
Pre-test	76.3			
		29.8	3.73	25.2*
Post-test	46.5			

*0.005 level of significance.

In group A for activities of daily living the calculated paired ‘t’ value is 25.2 and ‘t’ table value is 3.250 at 0.005 level. Since the calculated ‘t’ value is more than ‘t’ table value, it shows that there is significant difference in activities of daily living following PNF diaphragm technique among parkinson’s patients.

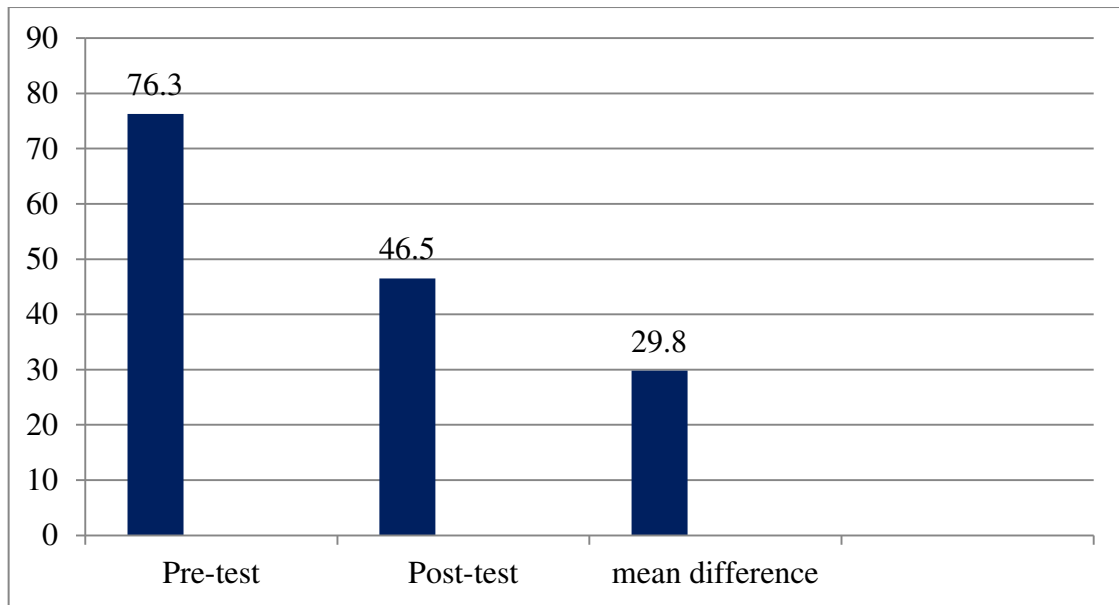


Figure 6: Graphical representation of pre and post-test mean values of activities of daily living in Group A.

TABLE: 5

Comparative mean value, mean difference, standard deviation and paired ‘t’ value between pre and post-test values of activities of daily living among Group B.

Measurement	Mean	Mean Difference	Standard Deviation	Paired ‘t’ value
Pre-test	75.4	20	5.53	11.4*
Post-test	55.4			

*0.005 level of significance.

In group B for activities of daily living the calculated paired ‘t’ value is 11.4 and ‘t’ table value is 3.250 at 0.005 level. Since the calculated ‘t’ value is more than ‘t’ table value, it shows that there is significant difference in activities of daily living following conventional physiotherapy among parkinson’s patients.

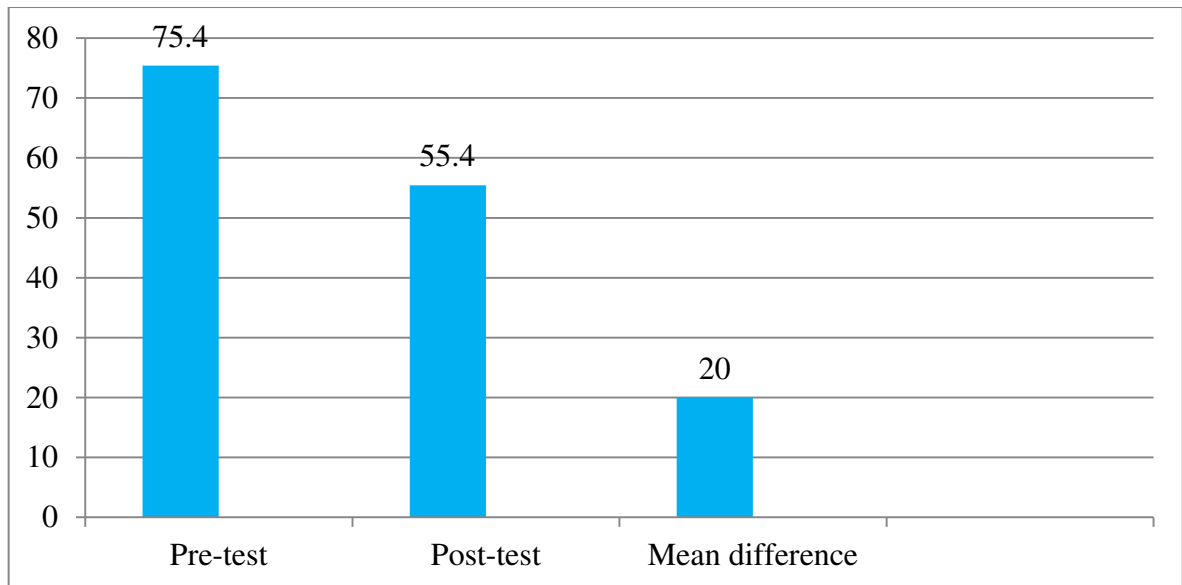


Figure 7: Graphical representation of pre and post-test mean values of activities of daily living in Group B.

TABLE: 6

Comparative mean value, mean difference, standard deviation and unpaired ‘t’ values of activities of daily living between Group A and Group B.

S.no	Groups	Improvement		Standard deviation	Unpaired “t” Test
		Mean	Mean difference		
1	Group-A	29.8	9.8	4.72	4.61
2	Group-B	20.0			

*0.005 level of significance

In group A and B for activities of daily living the calculated paired ‘t’ value is 4.61 and ‘t’ table value is 2.87 at 0.005 level. Since the calculated ‘t’ value is more than ‘t’ table value, it shows that there is significant difference between PNF diaphragm technique and conventional physiotherapy exercises in activities of daily living among parkinson’s patients.

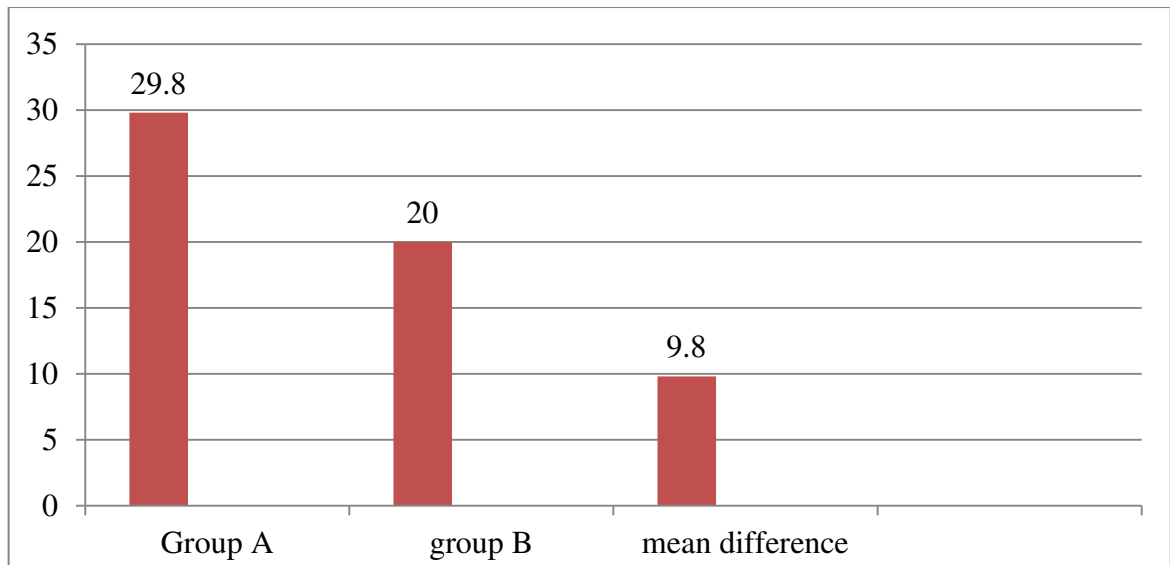


Figure 8: Graphical representation of mean values of activities of daily living in Group A and Group B.

4.2 Results

20 Parkinson's subjects were selected for the study. The subjects were randomly divided into two groups.

Group A was treated with PNF diaphragm technique.

Group B was treated with conventional physiotherapy exercises.

Before starting the treatment, endurance was graded by six minute walk test and activities of daily living was graded by SPDDS. The measurement was repeated at the end of the study duration.

Analysis of dependent variable endurance in Group A: The calculated paired 't' value is 29.7 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value there is significant difference in endurance following PNF diaphragm technique among parkinson's patients.

Analysis of dependent variable endurance in Group B: The calculated paired 't' value is 10.4 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value there is significant difference in endurance following conventional physiotherapy exercises among parkinson's patients .

Analysis of dependent variable endurance between Group A and Group B: The calculated unpaired 't' value is 4.53 and the table 't' value is 2.878 at 0.005 level of significance. Hence, the calculated 't' value is greater than table 't' value there is significant difference between PNF diaphragm technique and conventional physiotherapy exercises in improving endurance among parkinson's patients .

When comparing the mean values of Group A and B, Group A subjects treated with PNF diaphragm technique showed more difference than Group B. Hence it is

concluded that PNF diaphragm technique is more effective than conventional physiotherapy exercises in improving endurance among parkinson's patients.

Analysis of dependent variable activities of daily living in Group A: The calculated paired 't' value is 25.2 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value there is significant difference in activities of daily living following PNF diaphragm technique among parkinson's patients .

Analysis of dependent variable activities of daily living in Group B: The calculated paired 't' value is 11.4 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value there is significant difference in activities of daily living following with conventional physiotherapy exercises among parkinson's patients .

Analysis of dependent variable activities of daily living between Group A and Group B: The calculated unpaired 't' value is 4.61 and the table 't' value is 2.878 at 0.005 level of significance. Hence, the calculated 't' value is greater than table 't' value there is significant difference between PNF diaphragm technique and conventional physiotherapy exercises in improving activities of daily living among parkinson's patients .

When comparing the mean values of Group A and B, Group A subjects treated with PNF diaphragm technique showed more difference than Group B. Hence it is concluded that PNF diaphragm technique is more effective than conventional physiotherapy exercises in improving activities of daily living among parkinson's patients.

V DISCUSSION

In Parkinson's patients, endurance and activities of daily living is affected adversely.

The aim of the study was to compare the effectiveness PNF diaphragm technique and conventional physiotherapy exercises among parkinson's patients. The 20 parkinson's subjects divided into two groups, group A and B, each group consist of 10 subjects. Group A was treated with PNF diaphragm technique and group B was treated with conventional physiotherapy exercises.

Results of the present study shows that there is significant difference in endurance and activities of daily living following PNF diaphragm technique. It is supported by Paul *et al.*, (2017), they did a randomized controlled pilot trial to evaluate addition of PNF of respiration to pursed lip breathing exercise compared to effects of pursed lip breathing exercise in the management of COPD with 14 subjects (19 males, 5 females age group 40 – 60 years) and subjects were randomly allocated to receive either PNF of respiration and pursed lip breathing exercise (Group A) or pursed lip breathing exercise alone (Group B) outcome measures were distance covered in the six minute walk distance test and Modified Rate of Perceived Exertion(MRPE) during the 6 minute walk test. Between the group analysis showed that the results of Group A was statistically more significant than Group B for both the outcome measures (distance covered in 6 minute walk test (tvalue-13.62, pvalue<0.001).and MRPE (tvalue-2.95, p value<0.01). Hence, this study concluded that the PNF of respiration was more effective, improving exercise capacity in patients with COPD. Vidhyadhari (2015) studied the influence of PNF technique on diaphragm muscle activity and on pulmonary function in subjects with guillain- barre syndrome. 30 subjects who met inclusive criteria were

selected by random sampling method and divided into experimental and control groups (15 in each group). Diaphragm muscle activity is measured by surface EMG biofeedback; and concluded that pulmonary function (FEV/FVC) is measured with a portable electronic spirometer. These parameters were assessed before intervention and on the seventh day after intervention. The group treated with proprioceptive neuromuscular facilitation techniques (Rhythmic stabilization, repeated contractions) and breathing exercise had significant improvement on diaphragm muscle function measured in milliseconds and FEV/FVC compared to the group treated without proprioceptive neuromuscular facilitation techniques. PNF technique and breathing exercise had significant improvement on diaphragm muscle functions. The possible mechanism behind this may be the facilitator stimulus in the form of proprioceptive neuromuscular facilitation respiration is adopted to create reflex respiratory movement responses. It modifies the rate and depth of breathing, improving compliance and thereby improving the exercise capacity. (Paul *et al.*, 2017)

Results of the present study show that there is a significant difference in endurance and activities of daily living following conventional physiotherapy. It is supported by Claire *et al.*, (2013) who studied the role of physiotherapy is to maximize the functional ability and minimize secondary complications through movement rehabilitation. The aim is to improve quality of life by exercise, gait training, cueing, dance or martial arts and the treatment was effective. Danique *et al.*, (2017) did a study on the care of people with Parkinson's disease with consequences for their daily activities. The first main focus was on physical capacity, functional ability, core elements including activities of daily living, transfer and gait. The second exercise works on symptomatic treatment, suppression of motor symptoms. The third exercise also improves non-motor symptoms such as depression and apathy.

fatigue and cognitive elements, physical therapy inventions are good. This may be because of the increased strength and flexibility of core muscles and balance as a whole. Positive results were greater for lower and upper limb strength, endurance or speed as well as for metabolic functions. (Martine *et al*2015)

Hence the hypothesis first and second were rejected and third accepted.

VI CONCLUSION

20 Parkinson's patients were included in this study and randomly divided into two groups and each group consisted of 10 subjects. Group A was treated with PNF diaphragm technique. Group B was treated with conventional physiotherapy. After two weeks of intervention endurance and activities of daily living improved significantly.

The statistical result shows that there is improvement in both the groups. When comparing both, PNF diaphragm technique showed more significant improvement in endurance and activities of daily living among parkinson's patients than conventional physiotherapy.

6.1 Limitations

- Limited sample size.
- Social factor.
- Short duration study.

6.2 Suggestions

- Large study group can be done for better results.
- Study duration can be increased.
- Compared with other exercises.

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ANNEXURES

Annexure I

Assessment Chart

I. Subjective Examination

Name :

Age :

Sex :

Dominance :

Occupation :

Address :

Chief complaints :

History of present illness :

Past medical history :

Previous treatment history :

Drug history :

Family history :

Social history :

Personal history :

Occupational history :

General examination :

Vital sign :

II Objective examination

A) On observation

Built of patient :

Musculature :

Trophical changes :

External appliances :

Deformities :

B) On palpation

Tenderness :

Warmth :

Tone :

Oedema :

Spasm :

C) On examination

I Higher Functions

a) Level of consciousness

Glasgow coma scale

II Sensory assessment scale

Superficial senses :

Deep senses :

Combined cortical :

IV Motor examination

a) Muscle power : Upper extremity

b) Tone

Assess hyper tonicity and hypo tonicity

c) Girth measurement

d) Deep tendon reflexes

e) Superficial reflexes

f) Primitive reflexes

g) Range of motion

V Co-ordination

Equilibrium test

Non – equilibrium test

VI Functional assessment

Six minute walk test

Self-assessment parkinsons disease disability scale

Annexure II

Six Minute Walk Test Assessment Sheet

Patient Name:

Date :

Age/ Sex :

IP/OP No :

Diagnosis :

Parameters:

Parameters	Baseline	End of test	After one minute rest	Comments
Time(6MWT Start and end time)				
Heart rate				
Respiratory Rate				
SPO ₂ (%)				
BP				
Dyspnea				
Rest periods				
Rest time per period				
Reason for rest				

Distance walked:

Report:

Therapist Signature:

Annexure II

Questionnaire for self parkinsons disease disability scale

ITEMS	I (Poor)	II (Fair)	III (Good)	IV (Very good)	V (Excellent)
Washing face and hands					
Brushing teeth					
Using a telephone					
Making tea or coffee					
Inserting and removing an electric plug					
Pouring milk from a bottle					
Getting out of bed					
Getting up out of armchair					
Picking up object from floor					
Having a shower					
Getting undressed					
Holding and reading newspaper					
Holding cup and saucer					

Walking about house or flat					
Getting dressed					
Walking down the stairs					
Doing the dishes					
Walking up the stairs					
Walking outside to local shops					
Cutting food with knife					
Opening tins					
Turning over in bed					
Travelling by public transport					
Writing a letter					

Annexure IV

Raw scores of endurance

Table 7: Pre and post test values of endurance of group A.

Sr. No.	Pre test	Post test
1.	140	172
2.	137	175
3.	149	180
4.	132	170
5.	145	182
6.	139	174
7.	150	185
8.	142	182
9.	135	179
10.	137	171

Table 8: Pre and post test values of endurance of group B.

Sr. No.	Pre test	Post test
1.	140	150
2.	137	165
3.	149	162
4.	132	160
5.	145	172
6.	139	164
7.	150	175
8.	142	172
9.	135	169
10.	137	161

Raw scores of activities of daily living

Table 9: Pre and post test values of activities of daily living group A.

Sr. No.	Pre test	Post test
1.	70	43
2.	75	41
3.	72	46
4.	76	48
5.	80	54
6.	82	52
7.	85	55
8.	71	41
9.	74	45
10.	78	40

Table 10: Pre and post test values of activities of daily living group B.

Sr. No.	Pre test	Post test
1.	72	51
2.	74	55
3.	71	57
4.	78	59
5.	75	55
6.	70	52
7.	85	51
8.	81	60
9.	72	58
10.	76	56

PATIENT CONSENT FORM

I Voluntarily consent to participate in the research named on **“EFFECTIVENESS OF PNF TECHNIQUES ON DIAPHRAGMATIC MUSCLE ACTIVITY IN THE MANAGEMENT OF SELECTED OUTCOME VARIABLES AMONG PARKINSON’S PATIENTS ”**.

The researcher has explained me the treatment approach in brief, risk of participation and has answered the questions related to the study to my satisfaction.

Signature of patient

Signature of researcher