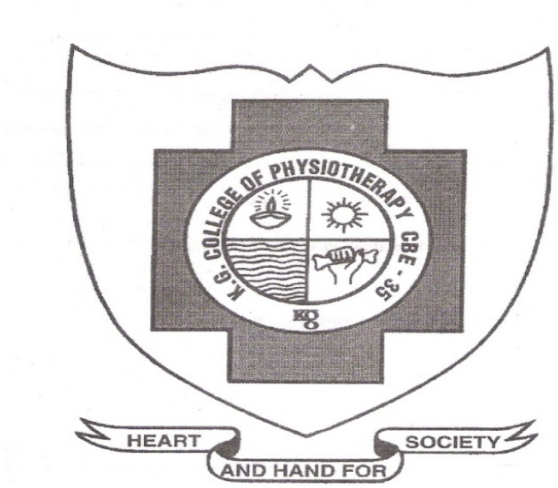
"A STUDY TO ANALYSE THE EFFECTS OF HOLD RELAX TECHNIQUE IN INCREASING SHOULDER RANGE OF MOTION AND QUALITY OF LIFE IN CHRONIC COPD PATIENTS HAVING SECONDARY POSTURAL DEFORMITIES."

AN EXPERIMENTAL STUDY



A DISSERTATION SUBMITTED TO THE TAMILNADU Dr. M.G.R MEDICAL UNIVERSITY, CHENNAI, AS PARTIAL FULFILLMENT OF THE MASTER OF PHYSIOTHERAPY DEGREE

APRIL 2012

A Dissertation on

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Has been submitted in partial fulfilment for the requirement of

the MASTER OF PHYSIOTHERAPY DEGREE

APRIL 2012

_____ _____

Internal Examiner **External Examiner**

CERTIFICATE

Certified that this is the bonafide work of **Ms .S. SUJANA** of K.G. College of Physiotherapy, Coimbatore submitted in partial fulfillment of the requirements for the Master of Physiotherapy Degree course from the Tamil Nadu Dr. M.G.R. Medical University under the **Registration No: 27102217** for the April 2012 Examination.

Date: Principal

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AN EXPERIMENTAL STUDY

Under the guidance of,

Principal: ……...

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.. Gratitude can never be expressed in words, but this is only a deep perception, which makes the words, to flow from ones heart.

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I INTRODUCTION

Chronic Obstructive Lung Disease (COPD) is a lung disease characterized by chronic obstruction of lung air flow that interferes with normal breathing and it is not fully reversible.

GOLD(Global initiative for Chronic Obstructive Lung Disease), defines COPD as a "preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually both progressive and associated with abnormal inflammatory response of lungs to noxious particles or gases".

COPD is common worldwide, contributes to major disability as well as economic and social burden. By 2020 COPD is expected to be the third leading cause of death. 14 Million Indians are suffering from COPD (***Indian Journal Chest Disability and Allied Sciences***). In India the 5% of Adults are affected and men are affected more than women.

In India, The number of men with COPD in 2010 was one and a half times the number of women with COPD in 2010 this pattern will continue through 2020. The most obvious explanation for this is the higher smoking rates in men than women.

COPD does not only affect the lungs, but other organs which also includes the peripheral muscle system. These factors which affects the peripheral muscle function includes reduced oxygen delivery, effects of inflammatory mediators, disuse of muscle, malnutrition, medications and co morbidities. Dyspnea, coughing, wheezing, sputum production and recurrent respiratory infection, deconditioning of muscle, muscle weakness, weight loss and malnutrition are observed in COPD patients. In COPD patients physical activity in daily life is significantly reduced compared to healthy subjects. Emotional problem such as depression, anxiety and social isolation are other characteristics observed in COPD patients. **(*Putt et al.*, 2008)**

Certain interventions are used to reverse weakness in peripheral muscles. In chronic COPD patients chest will be hyper inflated which reduces the elasticity of chest wall and shorten the Pectoralis major muscle which reduces chest expansion and increases the work of breathing. As the severity increases upper limb usage for functional task become difficult and this will again lead to muscle tightening and stiffness.

COPD over produces barrel chest deformity which develops slowly over years and months and pushes the chest wall out.

Due to inability to breath and limited movement the patient's upper chest is pushed forward causing kyphosis, which will increase stiffness and limits movement and limits the ability to take breath.

Chest wall muscle stretching technique will increase range of motion and vital capacity. The stretching of muscle fibers will increase the number of sarcomeres and increase the volume of visceral mass. Muscle stretching technique increases flexibility and reduces injuries. Stretching prevents the muscle from reacting sufficient peak tension which evolves to muscle weakness and retraction.

PNF techniques develop muscular strength and endurance, joint stability, mobility, neuromuscular control and coordination all of which are aimed at daily stretching and is employed to make quick gains in range of motion to help athletes improve improving the overall functional ability of patients **(*kabatt et al.*,2010)**

PNF encourage flexibility and coordination throughout the limb's entire range of motion. PNF is used to supplement performance. Good range of motion and better biomechanics, reduces fatigue and also helps in preventing overuse injuries.

Hold relax technique can be used to lengthen out tight muscle and increase passive range of motion. In this technique, the tight muscle is the antagonist, the agonist contracts.

PNF stretching is positioned in the literature as the most effective stretching technique when the aim is to increase ROM, particularly in respect to short-term changes in ROM. **(*Sharman et al., 2006*)**

Objective assessment of exercise performance, respiratory and peripheral muscle function, physical and Quality of life are integral parts of Physiotherapy. Exercise intolerance with disease progression is a feature of COPD. The exercise intolerance include increased difficulty in performing daily task, difficulty in participating in everyday events.

1.1 NEED FOR THE STUDY:

Secondary postural deformities occur in Chronic COPD patients due to hyperinflation , increased Work of Breathing. Certain postural changes that occurs in COPD patients include elevation, protraction, abducted scapula with medially rotated humerus and kyphotic special deformities. Since hyperinflation of chest keeps pectoralis major or in a shortened position increases the Work of Breathing.

1.2 PURPOSE OF THE STUDY:

The purpose of this study was aimed to stretch the short pectoralis major muscle and reverse the changes in the chest wall in chronic COPD patients , affected by secondary postural changes who have already underwent pulmonary rehabilitation using Hold-Relax technique.

1.3 OBJECTIVE OF THE STUDY:

The objective of my study is to determine:

- Whether the specific H-R technique is capable of reversing the effect of pectorals major muscle tightness by increasing shoulder horizontal extension range of motion.
- Whether the specific H-R technique is capable of reducing the secondary postural deformities, thereby improving Quality of Life in the same population.
- Whether the free exercises of upper limb are capable of increasing shoulder range of motion and quality of life.

1.4 KEY WORDS:

Chronic obstructive pulmonary disease

Hold relax technique

1.5 HYPOTHESIS:

NULL HYPOTHESIS:

There is no significant difference in the shoulder horizontal extension and Quality Of Life following Hold Relax technique.

ALTERNATE HYPOTHESIS:

There is significant difference in the shoulder horizontal extension and Quality of Life following Hold Relax technique.

II REVIEW OF LITERATURE

Russel Ricchardson et al., (2011)

Conducted a study on, skeletal Muscle Dysfunction vs. Muscle Disuse in Patients With COPD and it is concluded that ,in comparison with the control subjects, skeletal muscle dysfunction associated with COPD explains the elevated lactate release and a reduction in venous pH at a similar O_2 delivery at the same absolute sub maximal work rates in the patients with COPD..

Morey J. Koltber et al., (2010)

Conducted a study to investigate the interrater reliability, minimal detectable change and construct validity of an inclinometric measurement designed to quantify posterior shoulder tightness.(PST).study was done in 45 asymptomatic participants in a blinded repeated measures design. It was concluded that the use inclinometry provides an absolute angle of tightness that may be used for inter subject comparison, and to determine reference values.

Wang, PT et al.,(2010)

Conducted a study on the immediate and cumulative effects of proprioceptive neuromuscular facilitation (PNF) applied to the pelvic region on the gait of patients with hemiplegia of short and long duration . 20 patients with

hemiplegia of short duration, and long duration were included. and each subject received a total of 12 sessions of PNF (three times per week), with each treatment lasting for 30 minutes and they concluded that in both groups of patients with hemiplegia, the cumulative effects of PNF is more beneficial than the immediate effects, and patients with hemiplegia of short duration respond to training than do patients with hemiplegia of long duration.

Donrawee Leelarungrayub et al., (2009)

Concluded that acute clinical benefits of chest wall-stretching exercise on expired tidal volume, dyspnoea and chest expansion in a patient with chronic obstructive pulmonary disease: The procedure to increase chest mobility includes specific chest stretching and mobilization. Chest wall-stretching exercises were composed of thoracic rotation and anterior compression with stretching in sitting position, trunk extension and rib torsion in supine lying, and lateral stretching in side lying. Chest wall-stretching exercises were composed of thoracic rotation and anterior compression with stretching in sitting position, trunk extension and rib torsion in supine lying, and lateral stretching in side lying. These exercises were given to the patient as a regular daily program along with postural drainage, percussion, breathing exercise and limb exercises. The expired tidal volume, dyspnea level, and chest expansion were evaluated and clinical efficiency was

analyzed during CPT, compared to Pre-CPT and Post-CPT. The results showed a significant improvement of expired tidal volume, reduction in dyspnea level, and increase in chest expansion.

Kjensli et al.,(2009),

Stated that bone mineral density decreases with advancing chronic obstructive pulmonary disease (COPD) severity, The authors compared the prevalence of vertebral deformities in COPD patients with those in a population-based reference group to determine whether the number of deformities was related to the severity of COPD. In the study of 465 COPD patients and 462 controls, vertebral deformities were found in 31% of the COPD patients and 18% of the controls. . In females, the average number of vertebral deformities was almost two-fold when COPD severity increased from stage II to III. vertebral deformities was significantly higher in chronic obstructive pulmonary disease patients than in the controls.

Putt et al.,(2009)

Conducted a study on Muscle Stretching Technique Increases Vital Capacity and Range of Motion in Patients With Chronic Obstructive Pulmonary Disease. This study is to determine whether specific hold and relax stretching technique was

capable of reversing the effect of tight chest wall muscles by increasing chest expansion, vital capacity, and shoulder range of motion and decreasing perceived dyspnea and respiratory rate in persons with chronic obstructive pulmonary disease (COPD). Fourteen stable patients with COPD were enrolled, with 10 patients completing the study and they concluded that the hold and relax technique produces short-term benefits in patients with COPD and should be investigated further.

Minoguchi et al.,(2009)

Conducted a study on Cross-over comparison between respiratory muscle stretch gymnastics and inspiratory muscle training. and compares the effect of respiratory muscle stretch gymnastics (RMSG), with that of inspiratory muscle training (IMT)and it was concluded that, RMSG was significantly benefited which may be somewhat different from the benefits of IMT, in patients with COPD

Kim HC et al.,(2008)

COPD was characterized by inflammation induced airflow limitation and parenchyma destruction . Patients with COPD develops systemic problems including skeletal muscle and other organ specific dysfunction , nutritional abnormalities , weight loss and adverse psychological responses .

Hussain et al., (2008)

Limb and ventilator skeletal muscle dysfunction in COPD patients has been attributed to many factors including systemic inflammatory process ,. Nutritional depletion , chronic inactivity , age, hypoxemia , smoking and any vascular changes.

Donald Mahler et al.,(2007)

HRQL was assessed with SF 36 which consists of 36 questions that cover 9 health domains . It was concluded that SF 36 is a valid instructor to measure HRQL in patients with COPD and severity of dyspnea, but not respiratory function was a significant predictor of various components

Harper et al., (2007)

Conducted Study to assist clinicians and researchers in choosing outcome measures for patients with COPD attending routine OP clinic and a comparative assessment was undertaken and it was concluded that SF 36 as a comprehensive outcome measure for patients with long standing COPD.

Coen A. C. Ottenheijm et al.,(2006)

Conducted a study on Diaphragm Muscle Fiber Dysfunction in Chronic Obstructive Pulmonary Disease and it was concluded that inspiratory muscle weakness has been recognized to hyperinflation-induced diaphragm shortening.

Treatment of diaphragm dysfunction in COPD is complex but recent findings show the use of proteasome inhibitors in syndromes associated with muscle wasting, such as the diaphragm.

Franssen et al.,(2005)

Conducted a study on leg and arm muscle function in 59 stable COPD patients with preserved fat-free mass (FFM) and in 28 patients with reduced FFM relative to age- and sex-matched healthy control subjects and studied the effects of 8 wk of whole-body exercise training. This study concludes that the Lower- and upper-limb muscle dysfunction was observed in COPD patients, irrespective of the presence of FFM depletion. Generalized muscle weakness suggests systemic muscular involvement; arm endurance and the poor response of arm performance to exercise training is indicative for intrinsic differences in muscular adaptations between leg and arm muscles.

Jean Crowe,et al.,(2005)

Conducted a study on COPD Journal of Chronic Obstructive Pulmonary Disease, to determine the effect of inspiratory muscle training comparing with other rehabilitation interventions such as exercise and pulmonary rehabilitation among adults with chronic obstructive pulmonary disease. They conducted systematic review of the literature on inspiratory muscle and COPD. Inclusion

criteria for the review includes randomized controlled trials, comparing IMT or combined IMT and exercise pulmonary rehabilitation with other rehabilitation interventions among adults with COPD. The study in that performing a combination of IMT plus exercises may leads to significant improvements in inspiratory muscle strength and one outcome of exercise tolerance for individual with COPD.

Tinkelman et al.,(2005)

Assessed the health care utilization and cost impact of COPD in different age groups. In this study they compared burden of illness, utilization, and charges for younger versus older COPD patients and versus age- and gender-matched controls. They concluded that COPD is a burden to younger individuals in the workforce, who are likely to be enrolled in a commercial health plan.

Simon deo et al., (2003)

Conducted a study on peripheral muscle strength and training on copd patients., Strength training was found to have strong evidence for improving upper body and leg strength. No strong evidence for strength training was found for other outcome measures. The study concluded that further research is required to

investigate the effects of strength training on functional activities, such as balance, upper limb function, self care, and participation of daily life.

Maltant et al.,(2002)

Conducted study on Patients with COPD often develop systemic complication of the disease . Peripheral muscular disease is a complication and is characterized by atrophy , weakness and low oxidative capacity . These muscle changes will influence exercise tolerance and Quality of life, independent of impaired lung function in the following article .This study discussed evidence for peripheral muscle disease in patients with COPD and possible clinical implication of this problem.. The available therapeutic options to improve performance of muscle function in COPD was reviewed in this study.

Spourt et al., (2002)

Conducted study on the effects of end training on exercise capacity HRQL in COPD patients have been studied and evaluated the resistance training .This study investigated the effects of resistance training in comparison with end training in patients with moderate COPD with peripheral muscle weakness . It was concluded that resistance and end training have similar effects on peripheral muscle force , exercise capacity and HRQL in COPD patients with peripheral muscle weakness

Scalvini et al., (2001)

Conducted a study on effects of oxygen on autonomic nervous system dysfunction in patients with chronic obstructive pulmonary disease. Eleven stable COPD patients with chronic hypercapnic respiratory insufficiency undergone the evaluation of ANS by analysis of variability in cardiac frequency at rest and during both vagal and sympathetic stimuli breathing with and without oxygen supplementation. Thirteen male patients healthy and nonsmoking volunteers were included in control group.It was concluded that ,In stable patients with chronic obstructive pulmonary disease with chronic respiratory insufficiency, hypoxaemia is associated with derangements in the autonomic nervous system which was reversed by oxygen administration.

Scott Spernoga et al., (2001)

Conducted a study to measure the duration of maintained hamstring flexibility after a 1-time, modified hold-relax stretching protocol. All subjects was performed 6 warm-up active knee extensions, with the last repetition as the prestretch measurement. The experimental group received 5 modified (no-rotation) hold-relax stretches, whereas the control group rested supine on a table for 5 minutes. Posttest measurements were recorded for both group. They conclude that

a sequence of 5 modified hold-relax stretches produced significantly increased hamstring flexibility , lasted for 6 minutes after the stretching .

Watkins, et al., (2001)

Conducted a study on Reliability of goniometric measurements and visual estimates of knee range of motion obtained in a clinical setting. The study was to examine the intratester and intertester reliability for goniometric measurements of passive range of motion of knee flexion and extension and parallel forms reliability for PROM measurements of the knee obtained by use of a goniometer and it was examined in 43 patients. The study concluded that clinicians should use a goniometer to take repeated PROM measurements of a patient's knee to minimize the error associated with these measurements.

Jean-François Bellema et al., (2000)

Conducted a study on ,Thoracic Dimensions at Maximum Lung Inflation in Normal Subjects and in Patients With Obstructive and Restrictive Lung Diseases,to compare the distribution of lung volume at total lung capacity (TLC) among adult men and women known to have normal lung function or chronic obstructive disease or restrictive lung disease (RLD). 64 patients were included ,26 with severe COPD and increased TLC (COPD group), 29 with cystic fibrosis (CF) and

increased TLC (CF group), and 19 patients with RLD with a clinical diagnosis of pulmonary fibrosis and a reduced TLC (RLD group)and it was concluded that Variations in maximum lung volume caused by gender, growth, or by lung diseases are nonisotropic and entail substantial changes in chest wall.

Bandy et al., (1988)

Conducted a study to determine the optimal time and frequency of static stretching to increase flexibility of the hamstring muscles, as measured by knee extension range of motion (ROM). This study includes Ninety-three subjects (61 men, 32 women) ranging in age from 21 to 39 years and who had limited hamstring muscle flexibility. The four stretching groups was given stretching 5 days per week for 6 weeks. The fifth group, which served as a control, was not given stretching. The results of this study suggest that a 30-second duration is an effective amount of time to sustain a hamstring muscle stretch to increase Range of motion.

Troyer et al., (1988)

Conducted a study on Functional anatomy of the respiratory muscles. According to him, to keep arterial blood gases within acceptable limits, air must be moved rhythmically in and out of the lungs. Such a displacement was

accomplished through the expansion and deflation of the chest wall, and results in the normal action of a number of skeletal muscles. This study says that, it is necessary to have a clear understanding of the anatomy and the function of respiratory muscles.

Briggler et al., (1997)

Conducted a study to compare the effects of Dynamic ROM with static stretch on hamstring flexibility. Fifty-eight subjects, ranging in age from 21 to 41 years and with limited hamstring flexibility , were randomly assigned to three groups. One group performed Dynamic ROM ,5 days a week by lying supine with the hip in 90 degrees of flexion. The subject actively moved the leg into knee extension (5 seconds), held the leg in end range knee extension for 5 seconds, and then slowly lowered the leg to the starting position (5 seconds). These movements was performed six times per session (30 seconds of total actual stretching time). The second group performed 30-second static stretch for 5 days per week and the third group served as a control group The results of this study suggest that, although both static stretch and DROM will increase hamstring flexibility, a 30-second static stretch was more effective than the newer technique, enhancing flexibility.

III METHODOLOGY

3.1 STUDY DESIGN:

Two group Pre & Post test Experimental study design.

3.2 STUDY SETTING:

Study was conducted at the Department of Pulmonology, K.G Hospital, Coimbatore.

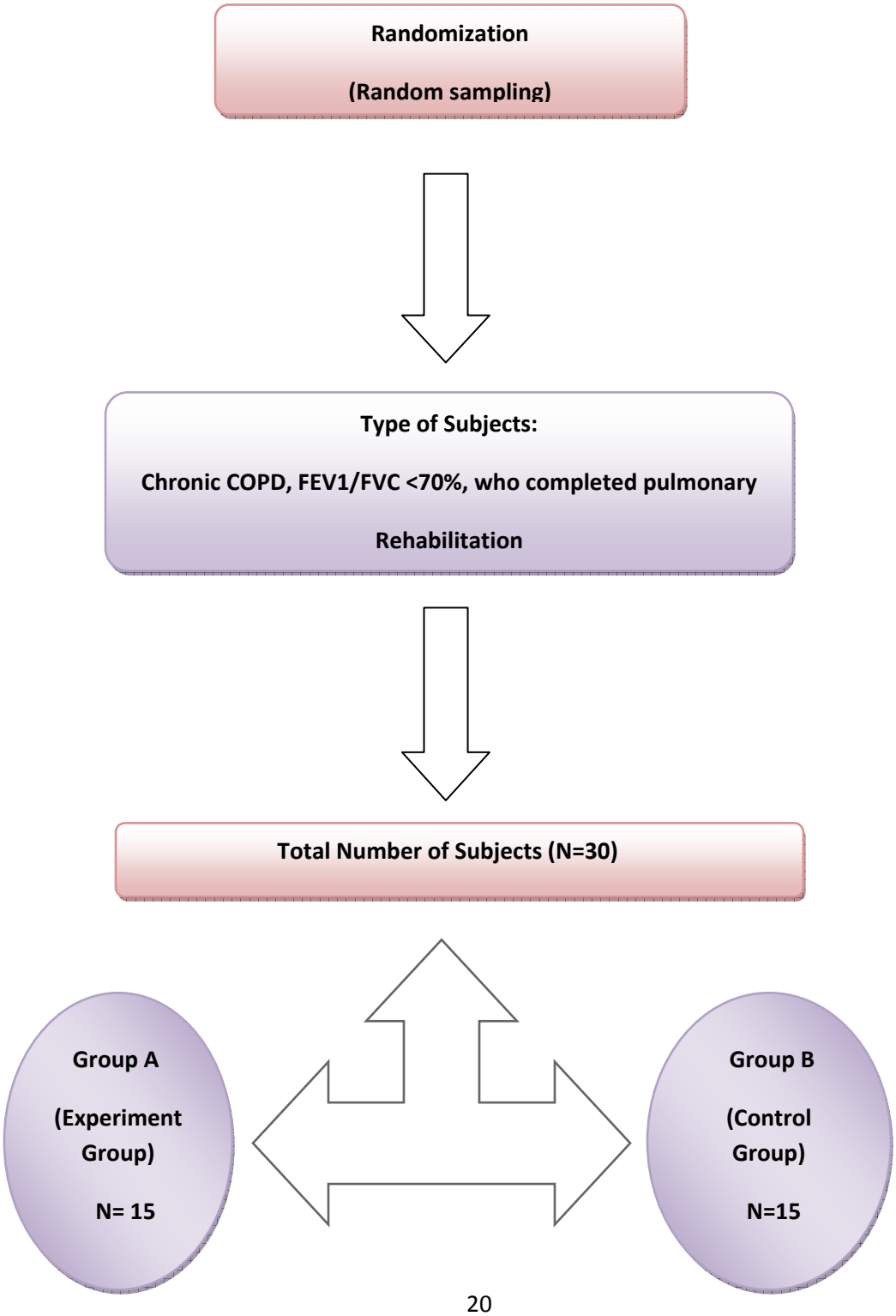
3.3 STUDY DURATION:

Study was conducted for a period of 3 months (12 weeks)

3.4 SAMPLING TECHNIQUE:

Simple Random Sampling by lot method.

3.5 SUBJECTS:


Randomization
(Random sampling)
Type of Subjects:
Chronic COPD, FEV1/FVC <70%, who completed pulmonary Rehabilitation
Total Number of Subjects (N=30)
Group A
(Experiment Group)
N= 15
Group B
(Control Group)
N=15

3.6 CRITERIA FOR SELECTION

INCLUSION CRITERIA:

- Patients classified as having mild COPD by the physicians were taken for the study.
- Ability to perform exercises.
- Both sexes.
- Patient in age group between 40-55years.

EXCLUSION CRITERIA:

- Patients with any associated problems of COPD
- Recent acute exacerbation of disease
- Conditions that contraindicate the application of hold and relax techniques.
- Secondary musculoskeletal disorders.
- Recent fractures or injury to the ribs, clavicle or upper limb.
- Recurrent subluxation or dislocation of either shoulder.
- Inability to perform isometric contraction.
- Connective tissue disorder
- Ischemic heart diseases
- Uncontrolled hyper tension

- Moderate to severe osteoporosis
- Addtional conditions restricting chest expansion (e.g. Obesity, severe scoliosis, ankylosing spondylitis)
- Systemic disease muscles and joints (e.g. Rheumatoid arthritis)
- Radical mastectomy with removal of the pectoralis major muscle.
- Recent chest or abdominal surgery.

3.7 VARIABLES:

INDEPENDENT VARIABLES:

- Hold & Relax technique

DEPENDENT VARIABLES:

- Shoulder Horizontal Extension (Right& Left)Range of Motion
- Quality of Life

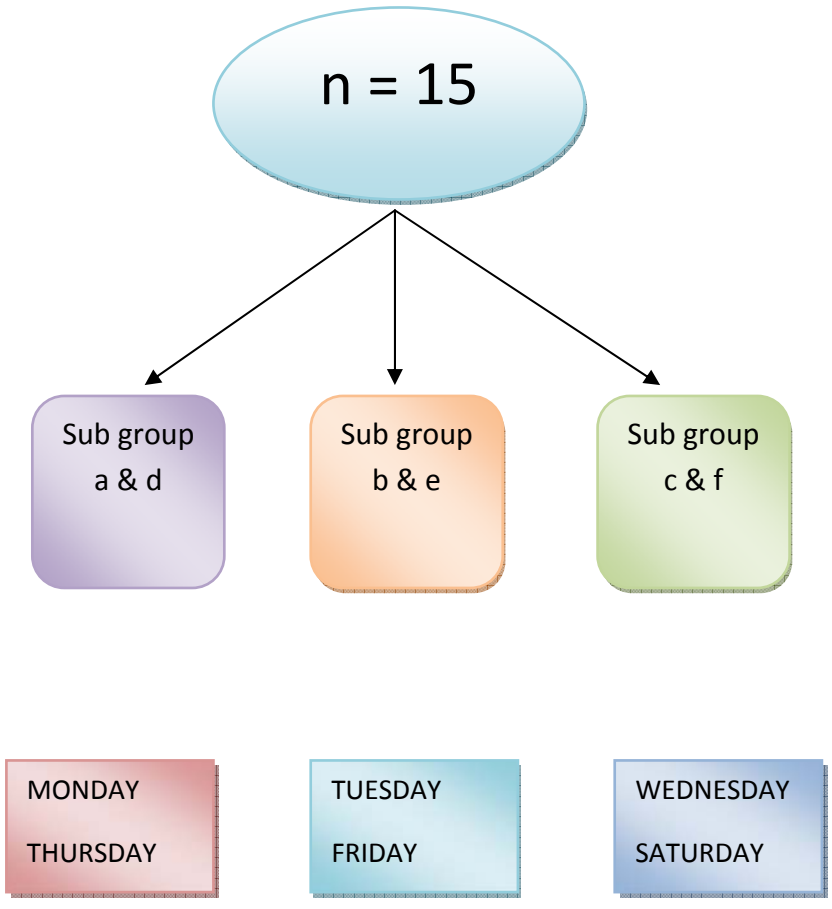
3.8 TOOLS:

- Goniometer
- SF-36 Questionnaire.

3.9 PROCEDURE:

The study was conducted in the Department of Pulmonology, K.G Hospital. All the patients visiting the Outpatient Department having COPD with secondary postural deformities were assessed and subjects who fulfilled the inclusion criteria were selected for the study. A total of 30 patients who had already completed pulmonary rehabilitation were selected and randomized by simple random sampling method and allocated to 2 groups of 15 each. A written consent was obtained from patients.

TREATMENT PROTOCOL:



Total number of subjects = 30 members.

Subgroup Classification:

n=15(Experimental group)

Sub group a=5 members

Sub group b=5 members

Sub group c=5 members

n=15(Control group)

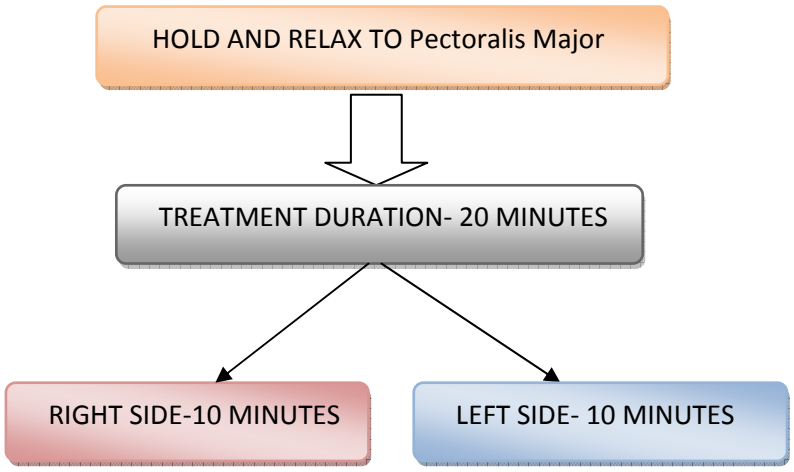
Sub group d=5 members

Sub group e=5 members

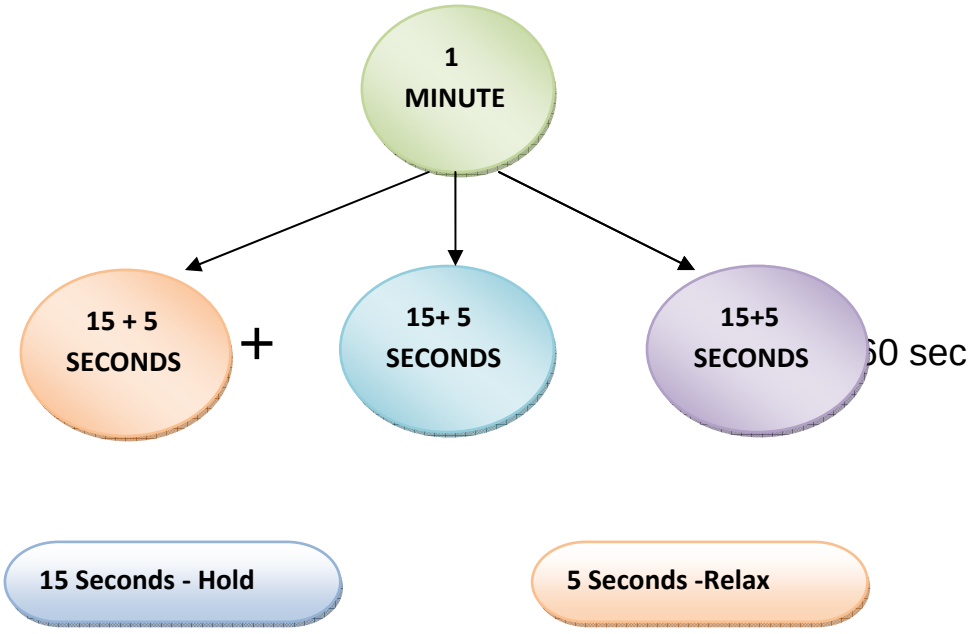
Sub group f=5 members

Group A(Experimental group) : Hold Relax technique.

TREATMENT TECHNIQUE TO GROUP A:



TREATMENT DURATION LIMITS:



Group B(Control group) : Patients underwent Free exercises.

The pre test values of shoulder: Horizontal extension and Quality of life were taken using Goniometer and SF-36 Questionnaire respectively. All patients were explained and demonstrated about the H-R technique which they had to perform.

Then the group was asked to perform H-R technique for a duration of 6 weeks after which shoulder Horizontal extension and Quality of life was assessed.

At the end of 12^{th} week the range of Shoulder Horizontal Extension was found to be increased with an increase in Quality of Life.

3.10. STATISTICAL TOOLS

Paired 't' Test

Paired 't' test was used to compare the pre Vs post & post Vs post test values of both the groups.

$$s = \sqrt{\frac{\sum d^2 - \frac{[\sum d]^2}{n}}{n-1}}$$

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

Where,

d = difference between pre test and post test

$\bar{d}$ = mean difference

n = total number of subjects

s = standard deviation

Unpaired ‘t’ Test

This was used to analyze the significance between experimental and control groups.

$$S = \sqrt{\frac{\sum\left(X_1 - \overline{X}_1\right)^2 + \sum\left(X_2 - \overline{X}_2\right)^2}{n_1 + n_2 - 2}}$$

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S}\sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

Where,

S	=	Standard deviation
$\overline{X}_1$	=	Mean of control groups
$\overline{X}_2$	=	Mean of experimental group
n1	=	Number of subjects in control groups
n2	=	Number of subjects in experimental group

Percentage of difference formula:

Percentage difference (A)

$$= \frac{\text{Post test mean - Pre test mean}}{\text{Post test mean}} \times 100$$

IV.DATA ANALYSIS AND INTERPRETATION

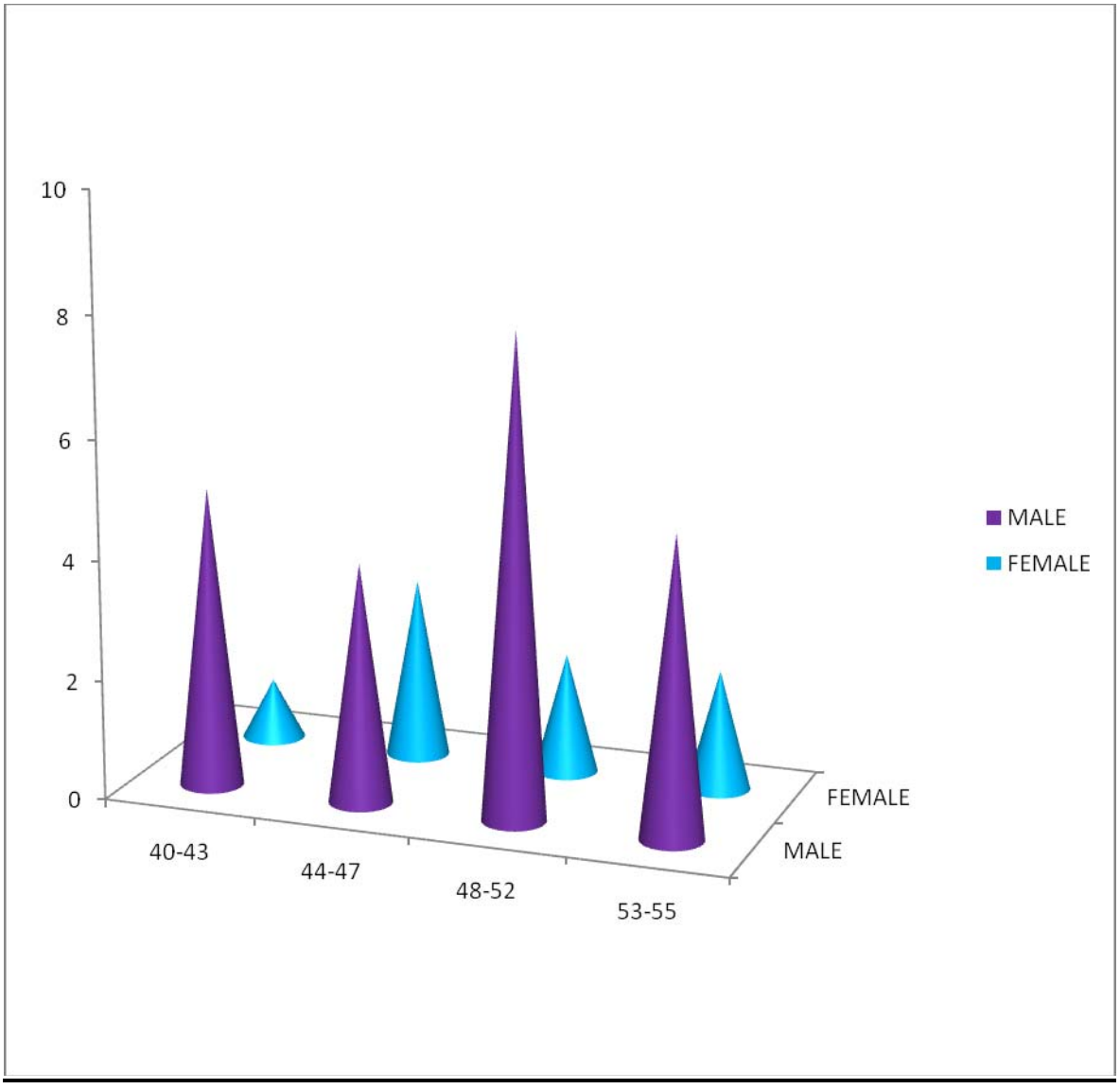
TABLE I

DEMOGRAPHIC DATA

S.NO	AGE GROUP CLASSIFICATION	SEX	
		MALE	FEMALE
1	40—43	5	1
2	44—47	4	3
3	48—52	8	2
4	53—55	5	2
	Total	30	

GRAPH - 1

AGE GROUP CLASSIFICATION



4.1 A. DATA ANALYSIS AND INTERPRETATION

TABLE-II

Right Shoulder Horizontal extension Range of Motion of Group A

S.NO	GROUP	MEAN	STANDARD DEVIATION	't' VALUE(P<0.05)	Percentile difference
1.	Pre-test	18.60	± 4.58	16.5804	64%
2.	Post-test	30.60	± 3.58		

Table shows statistical analysis of pre and post test values of Range of Motion in Group A.

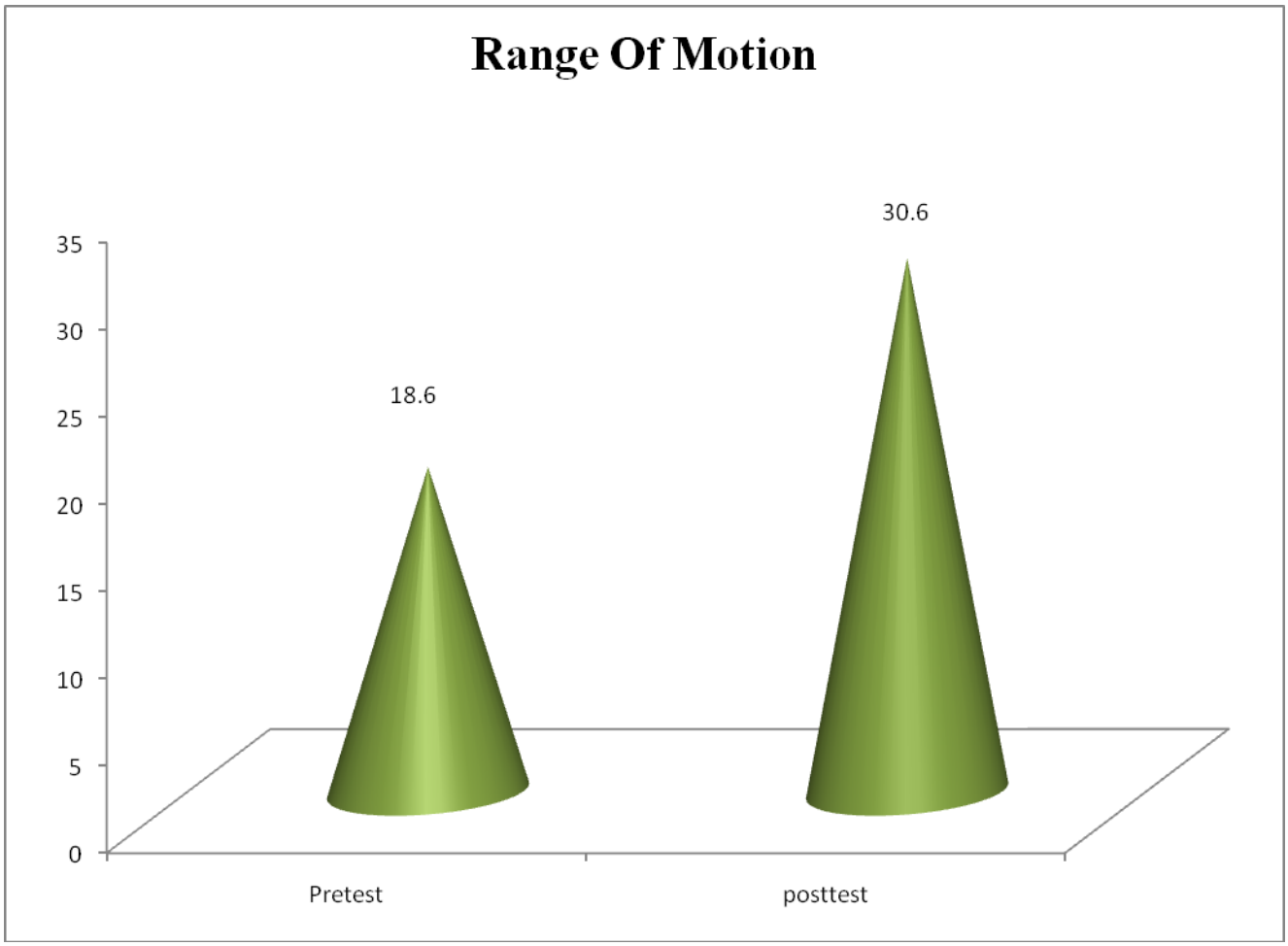
4.1.B ANALYSIS OF RESULT

Using paired 't' test

Comparing pre and post test of Range of Motion in Group A. Calculated 't' value (16.5804) is greater than table value (1.761) at 5% level significance for two tailed 't' test showing that there is significant difference between two groups.

4.1.C. GRAPH- 2

GRAPHICAL REPRESENTATION PRE TEST AND POST TEST VALUES OF GROUP A



4.2.A TABLE-III

Right Shoulder Horizontal Extension Range of Motion of Group B

S.NO	GROUPS	MEAN	STANDARD DEVIATION	't' VALUE(p>0.05)	Percentile difference
1.	Pre-test	19.33	± 4.22	15.2846	27%
2.	Post-test	24.60	± 4.29		

Table shows statistical analysis of pre and post test values of Range of Motion in Group B.

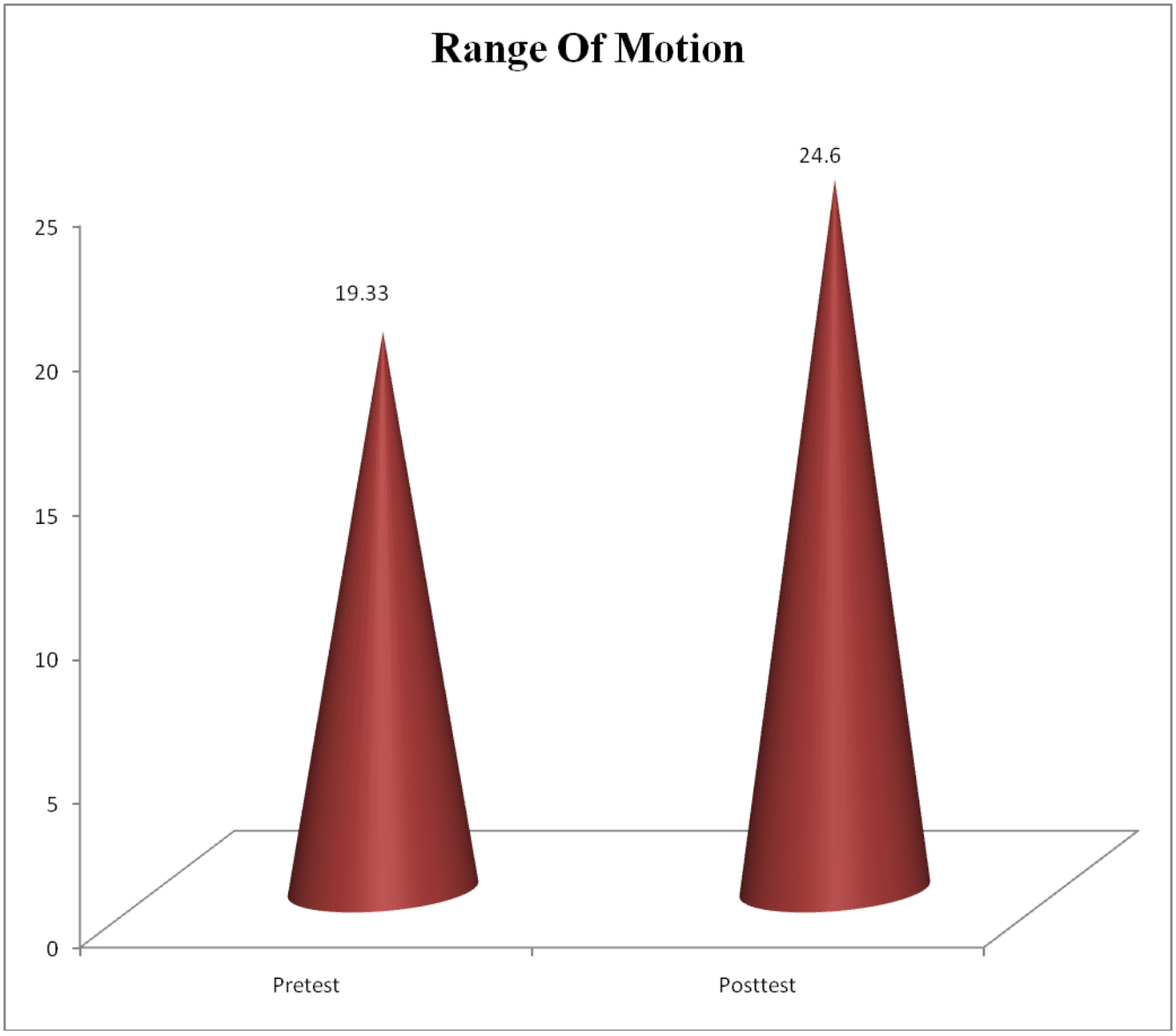
4.2.B ANALYSIS OF RESULT

Using paired 't' test

Comparing pre and post test of Range of Motion in Group B. Calculated 't' value (15.2846) is greater than table value (1.761) at 5% level significance for two tailed 't' test showing that there is significant difference between two groups.

4.2.C. GRAPH- 3

GRAPHICAL REPRESENTATION PRE TEST AND POST TEST VALUES OF GROUP B



4.3.A TABLE-IV

Right Shoulder Horizontal extension Range of Motion of Group A &Group B

S.NO	GROUPS	MEAN	STANDARD DEVIATION	't' VALUE
1.	Group A	30.60	± 3.58	4.1583
2.	Group B	24.60	± 4.29	

Table shows statistical analysis of post test values of Range of Motion in Group A &Group B.

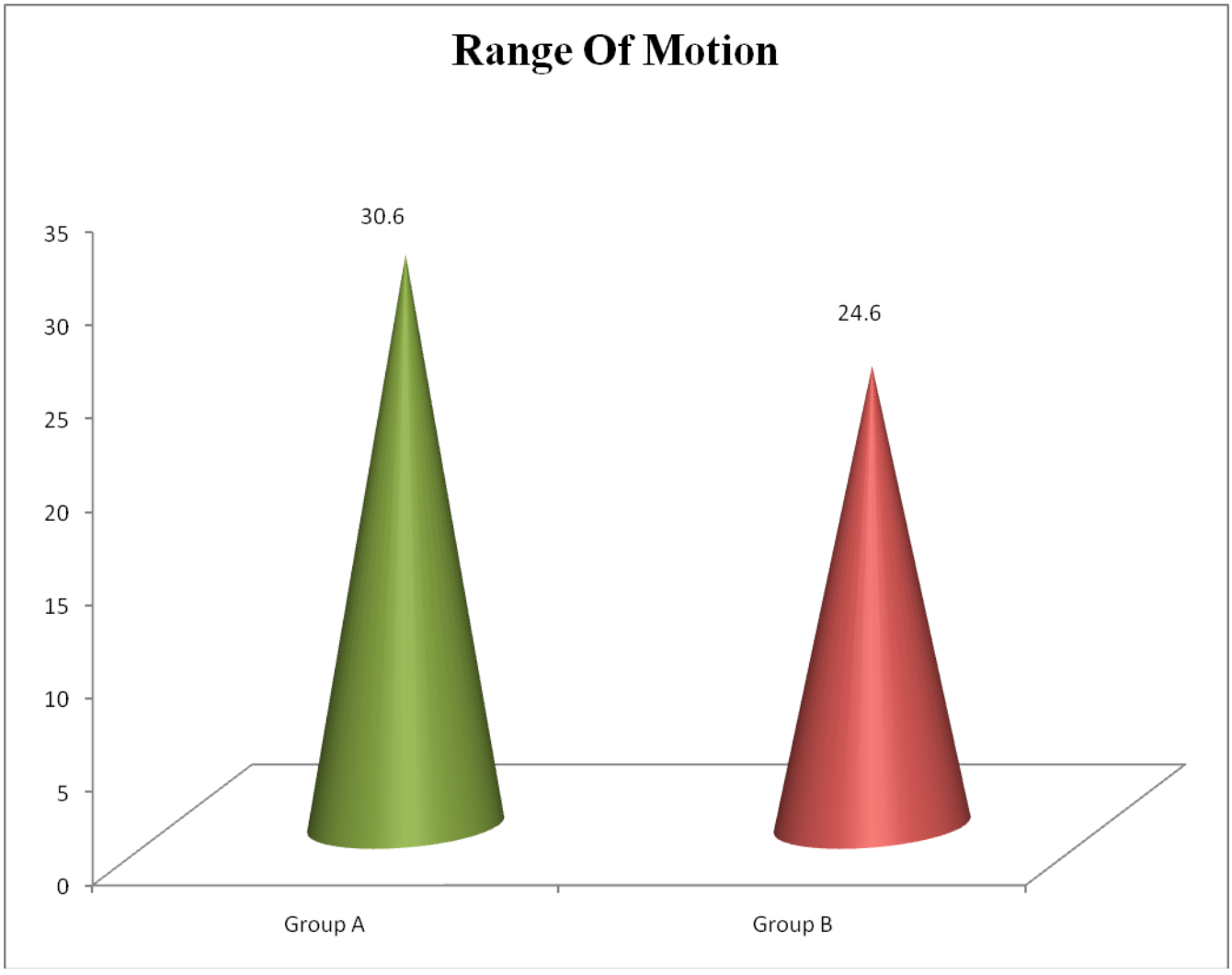
4.3.B ANALYSIS OF RESULT

Using unpaired 't' test

Comparing post test of Range of Motion in Group A & B. Calculated 't' value (4.1583) is greater than table value (1.761) at 5% level significance for two tailed 't' test showing that there is significant difference between two groups.

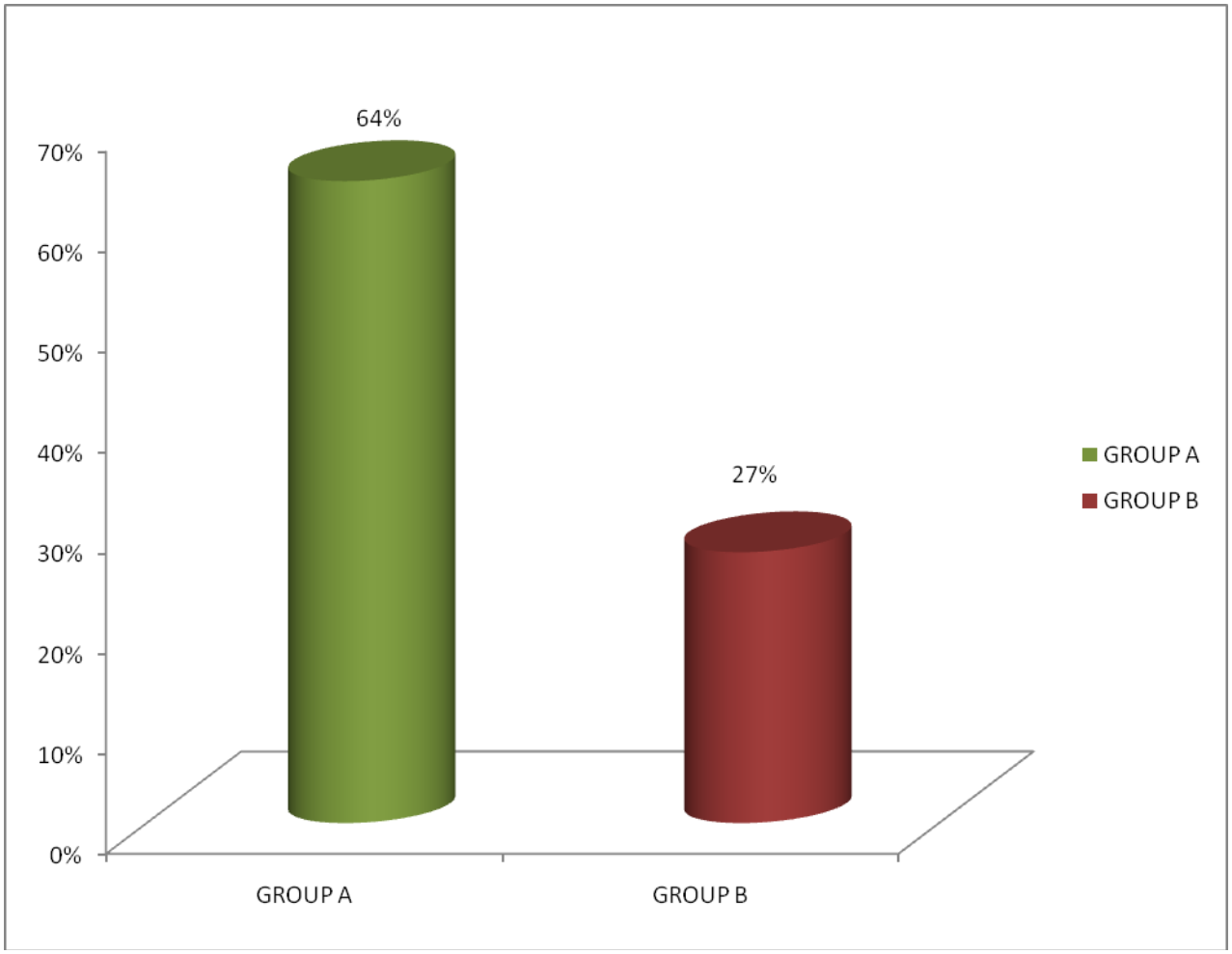
4.3.C. GRAPH- 4

GRAPHICAL REPRESENTATION OF POST TEST VALUES OF GROUP A & GROUP B



GRAPHICAL REPRESENTATION OF PERCENTILE DIFFERENCE IN RIGHT SIDE SHOULDER HORIZONTAL EXTENSION FOR GROUP A AND GROUP B PATIENTS.

GRAPH - 5



4.4.A TABLE-V

Left Shoulder Horizontal extension Range of Motion of Group A

S.NO	GROUPS	MEAN	STANDARD DEVIATION	't' VALUE (P<0.05)	Percentile difference
1.	Pre-test	20.60	± 3.42	22.200	53%
2.	Post-test	31.53	± 3.44		

Table shows statistical analysis of pre and post test values of Range of Motion in Group A.

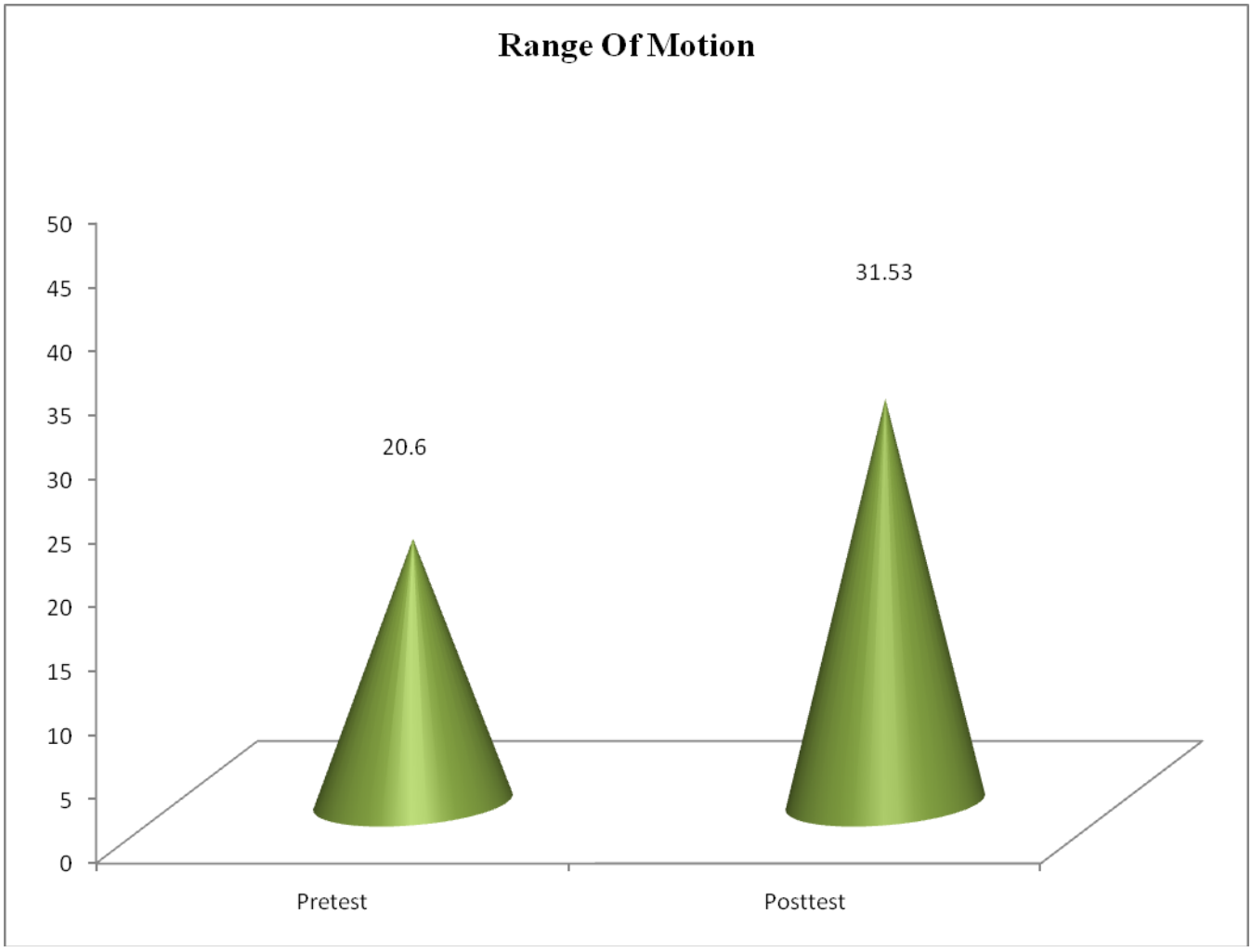
4.4.B ANALYSIS OF RESULT

Using paired 't' test

Comparing pre and post test of Range of Motion in Group A. Calculated 't' value (22.200) is greater than table value (1.761) at 5% level significance for two tailed 't' test showing that there is significant difference between two groups.

4.4.C. GRAPH- 6

GRAPHICAL REPRESENTATION PRE TEST AND POST TEST VALUES OF GROUP A



4.5.A TABLE-VI

Left Shoulder Horizontal extension Range of Motion of Group B

S.NO	GROUPS	MEAN	STANDARD DEVIATION	't' VALUE (p>0.05)	Percentile difference
1.	Pre-test	20.27	± 4.32	21.376	26%
2.	Post-test	25.73	± 4.22		

Table shows statistical analysis of pre and post test values of Range of Motion in Group B.

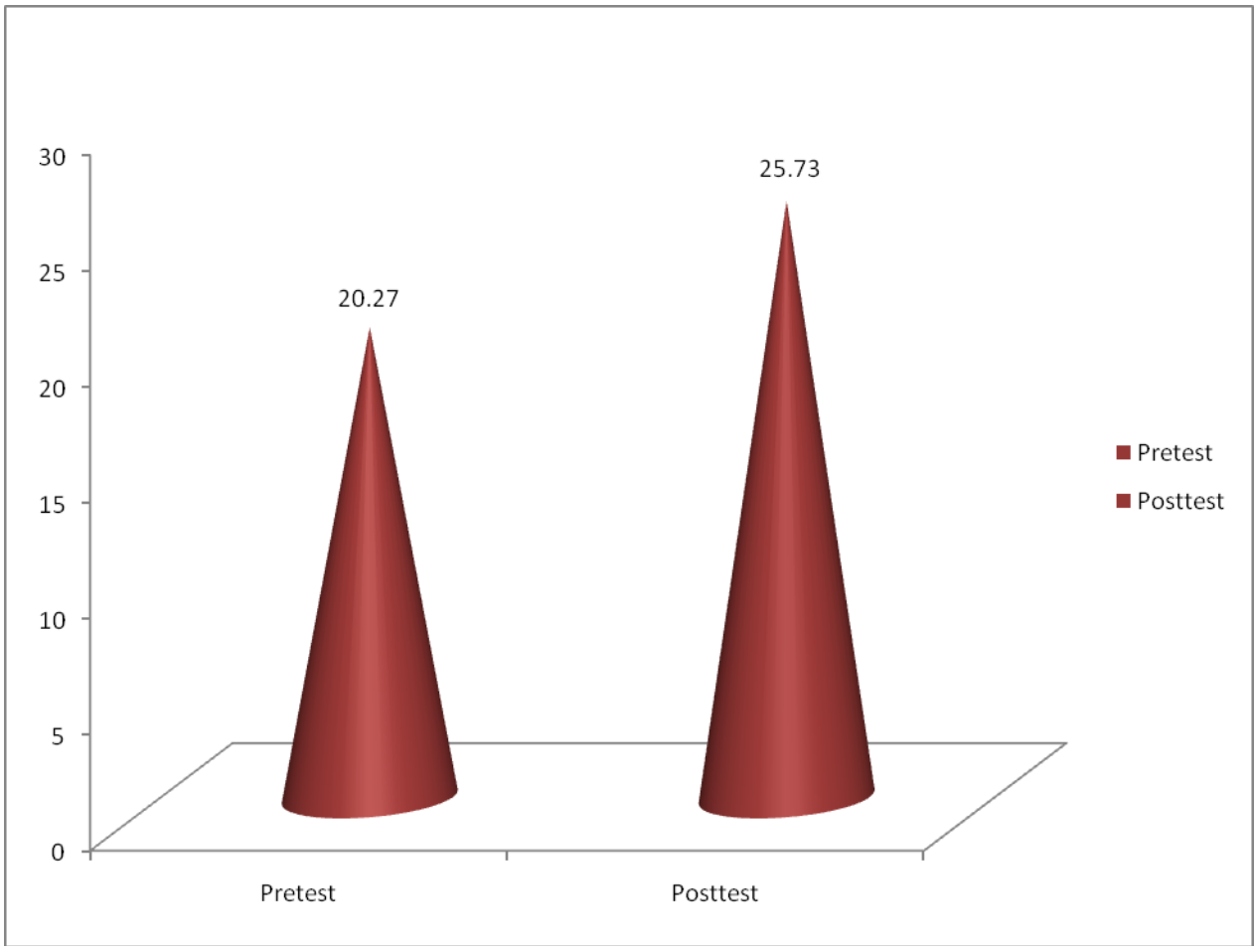
4.5.B ANALYSIS OF RESULT

Using paired 't' test

Comparing pre and post test of Range of Motion in Group B. Calculated 't' value (21.376) is greater than table value (1.761) at 5% level significance for two tailed 't' test showing that there is significant difference between two groups.

4.5.C. GRAPH- 7

GRAPHICAL REPRESENTATION PRE TEST AND POST TEST VALUES OF GROUP B



4.6.A TABLE-VII

Left Shoulder Horizontal extension Range of Motion of Group A &Group B

S.NO	GROUPS	MEAN	STANDARD DEVIATION	't' VALUE
1.	Group A	31.53	± 3.44	4.1275
2.	Group B	25.73	± 4.22	

Table shows statistical analysis of post test values of Range of Motion in Group A &Group B.

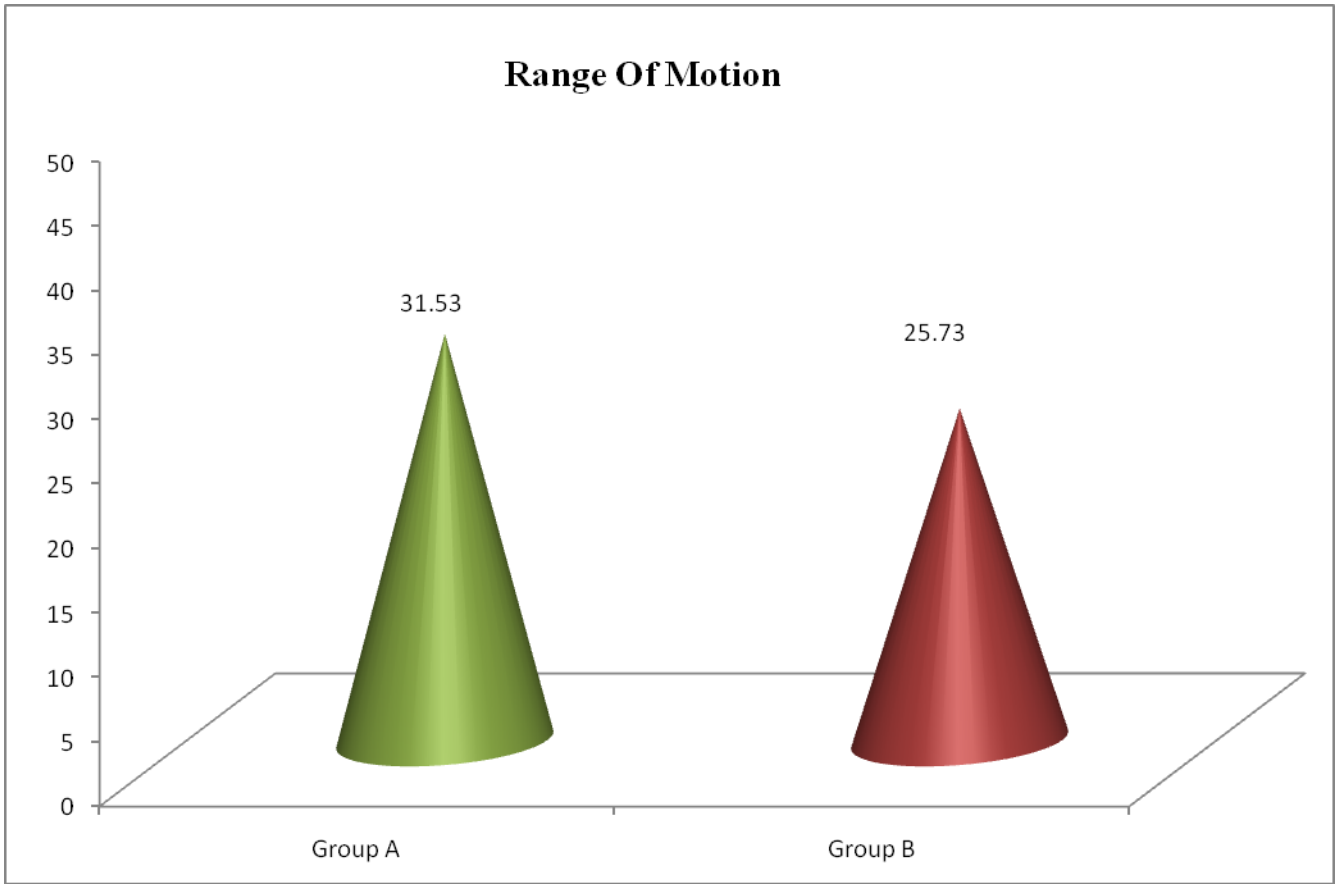
4.6.B ANALYSIS OF RESULT

Using unpaired 't' test

Comparing post test of Range of Motion in Group A & B. Calculated 't' value (4.1275) is greater than table value (1.761) at 5% level significance for two tailed 't' test showing that there is significant difference between two groups.

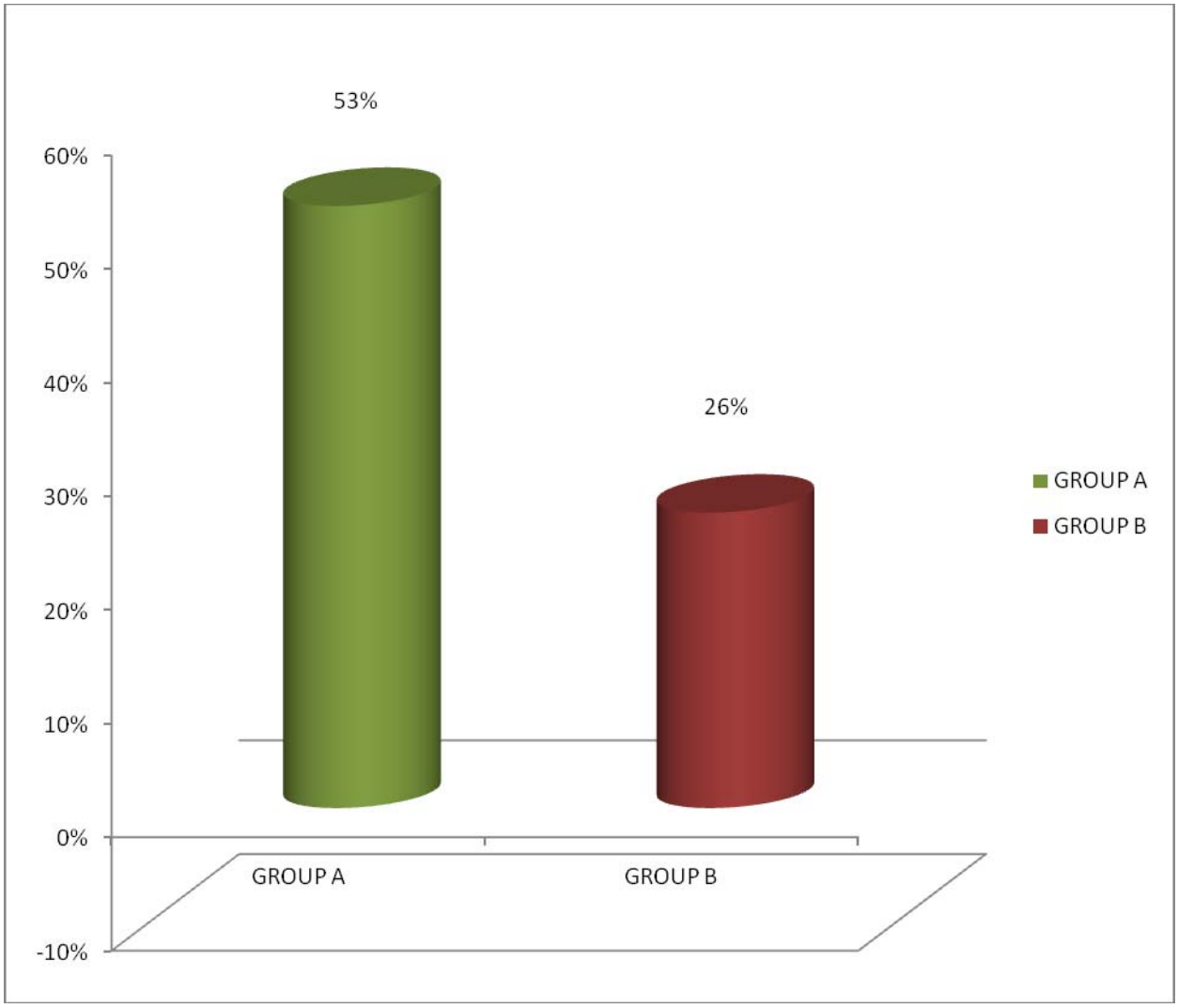
4.6.C. GRAPH-8

GRAPHICAL REPRESENTATION POST TEST VALUES OF GROUP A & GROUP B



GRAPHICAL REPRESENTATION OF PERCENTILE DIFFERENCE IN LEFT SIDE SHOULDER HORIZONTAL EXTENSION FOR GROUP A AND GROUP B PATIENTS.

GRAPH-9



4.7. A TABLE-VIII

SF – 36 QUESTIONNAIRE of Group A

S.NO	GROUPS	MEAN	STANDARD DEVIATION	't' VALUE (P<0.05)	Percentile difference
1.	Pretest	59.8	± 10.67	13.0482	29%
2.	Posttest	77.67	± 9.29		

Table shows statistical analysis of pre and post test values of SF- 36 Questionnaire in Group A .

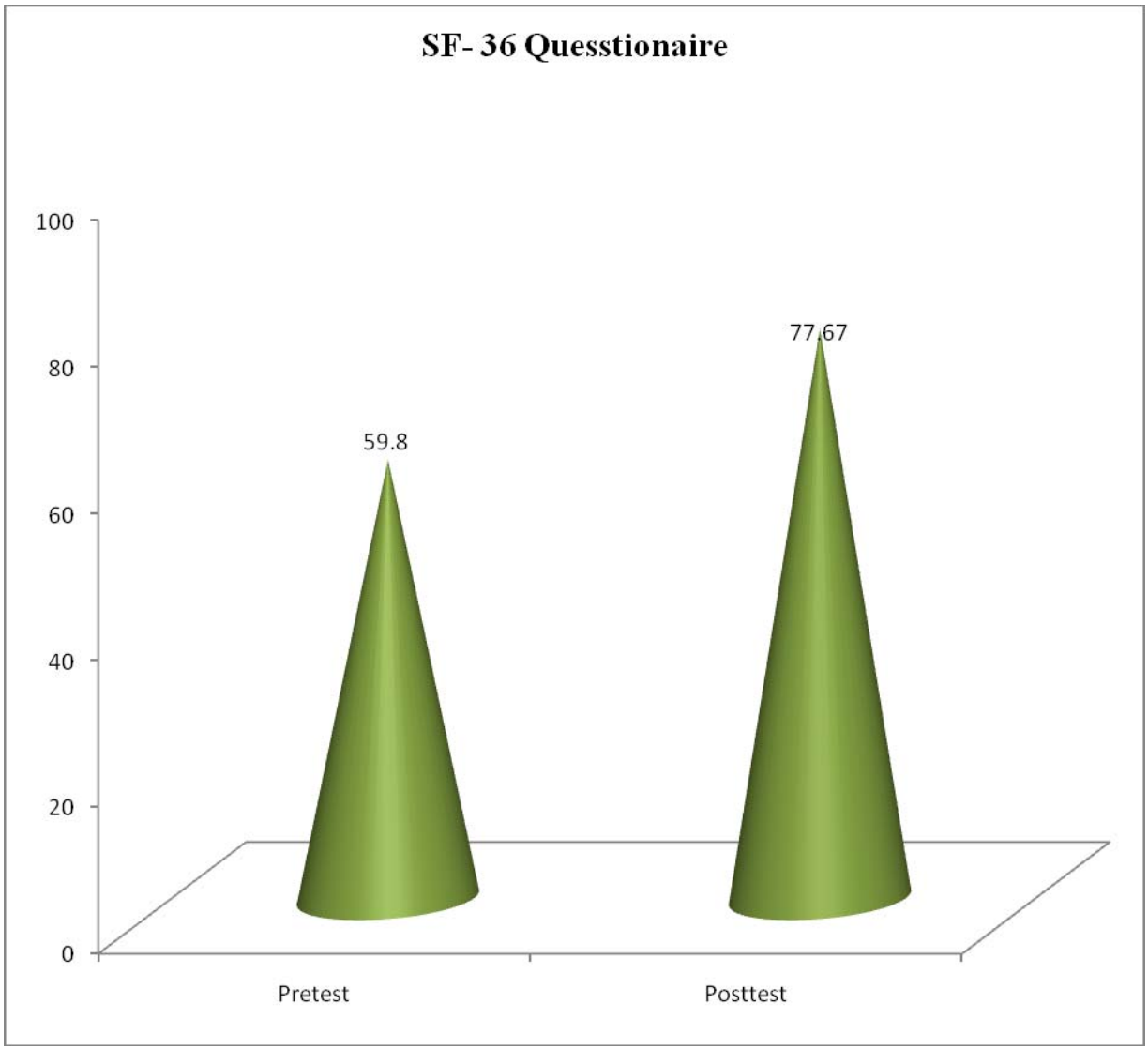
4.7. B ANALYSIS OF RESULT

Using paired 't' test

Comparing pre and post test values of SF- 36 Questionnaire in Group A. Calculated 't' value (13.0482) is greater than table value (1.761) at 5% level significance for two tailed 't' test showing that there is significant difference between two groups.

4.7.C. GRAPH- 10

GRAPHICAL REPRESENTATION OF PRE & POST TEST VALUES OF GROUP A



4.8.A TABLE-IX

SF – 36 QUESTIONNAIRE of Group B

S.NO	GROUPS	MEAN	STANDARD DEVIATION	't' VALUE (P>0.05)	Percentile difference
1.	Pretest	57.20	± 10.59	11.5219	14%
2.	Posttest	65.27	± 10.22		

Table shows statistical analysis of pre and post test values of SF- 36 Questionnaire in Group B .

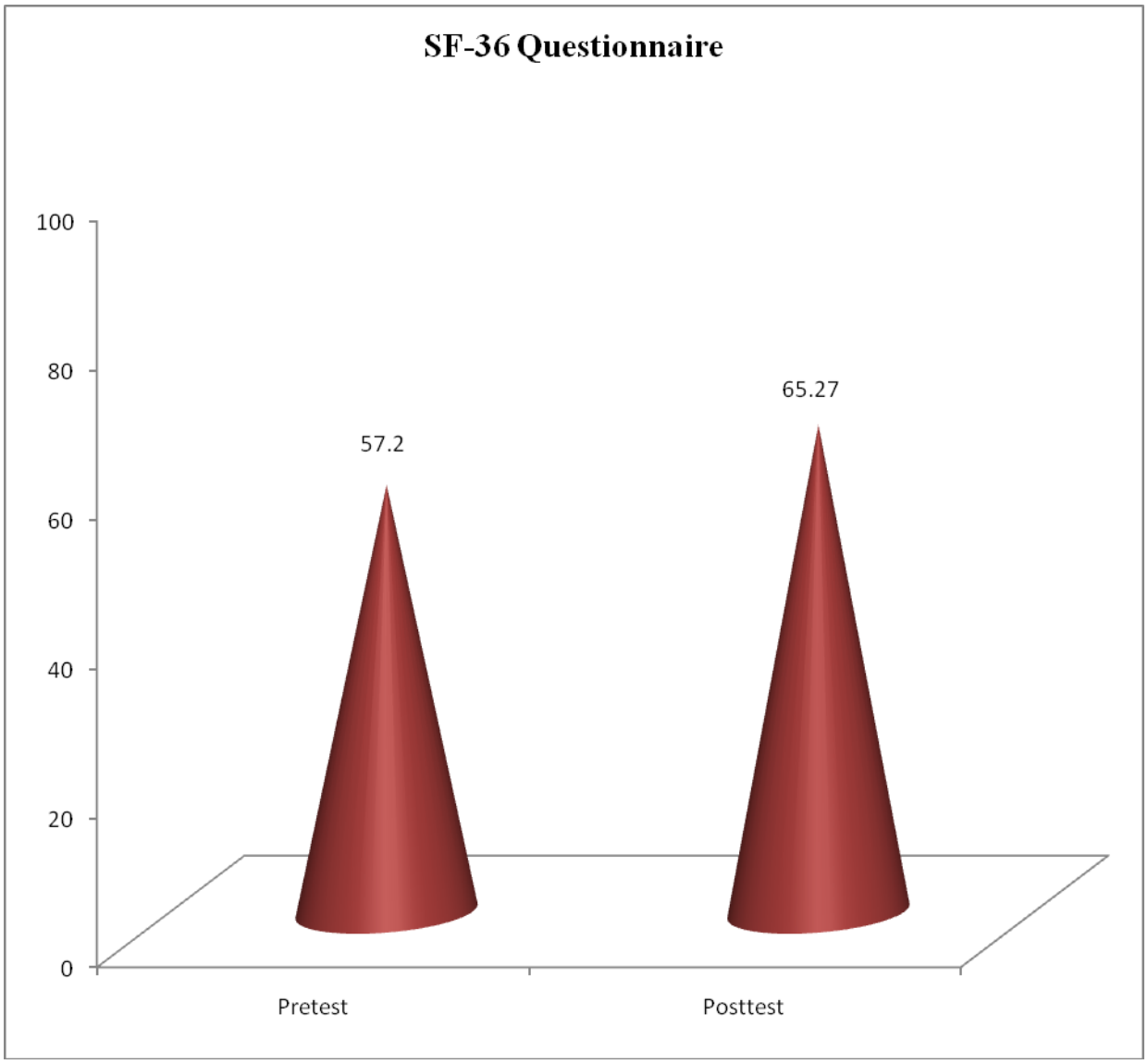
4.8. B ANALYSIS OF RESULT

Using paired 't' test

Comparing pre & post test values of SF- 36 Questionnaire in Group B. Calculated 't' value (11.5219) is greater than table value (1.761) at 5% level significance for two tailed 't' test showing that there is significant difference between two groups.

4.8.C. GRAPH- 11

GRAPHICAL REPRESENTATION OF PRE & POST TEST VALUES OF GROUP B



4.9.A TABLE-X

SF – 36 QUESTIONNAIRE of Group A & Group B

S.NO	GROUPS	MEAN	STANDARD DEVIATION	't' VALUE
1.	Group A	77.67	± 9.29	3.4774
2.	Group B	65.27	± 10.22	

Table shows statistical analysis of post test values of SF- 36 Questionnaire in Group A & Group B .

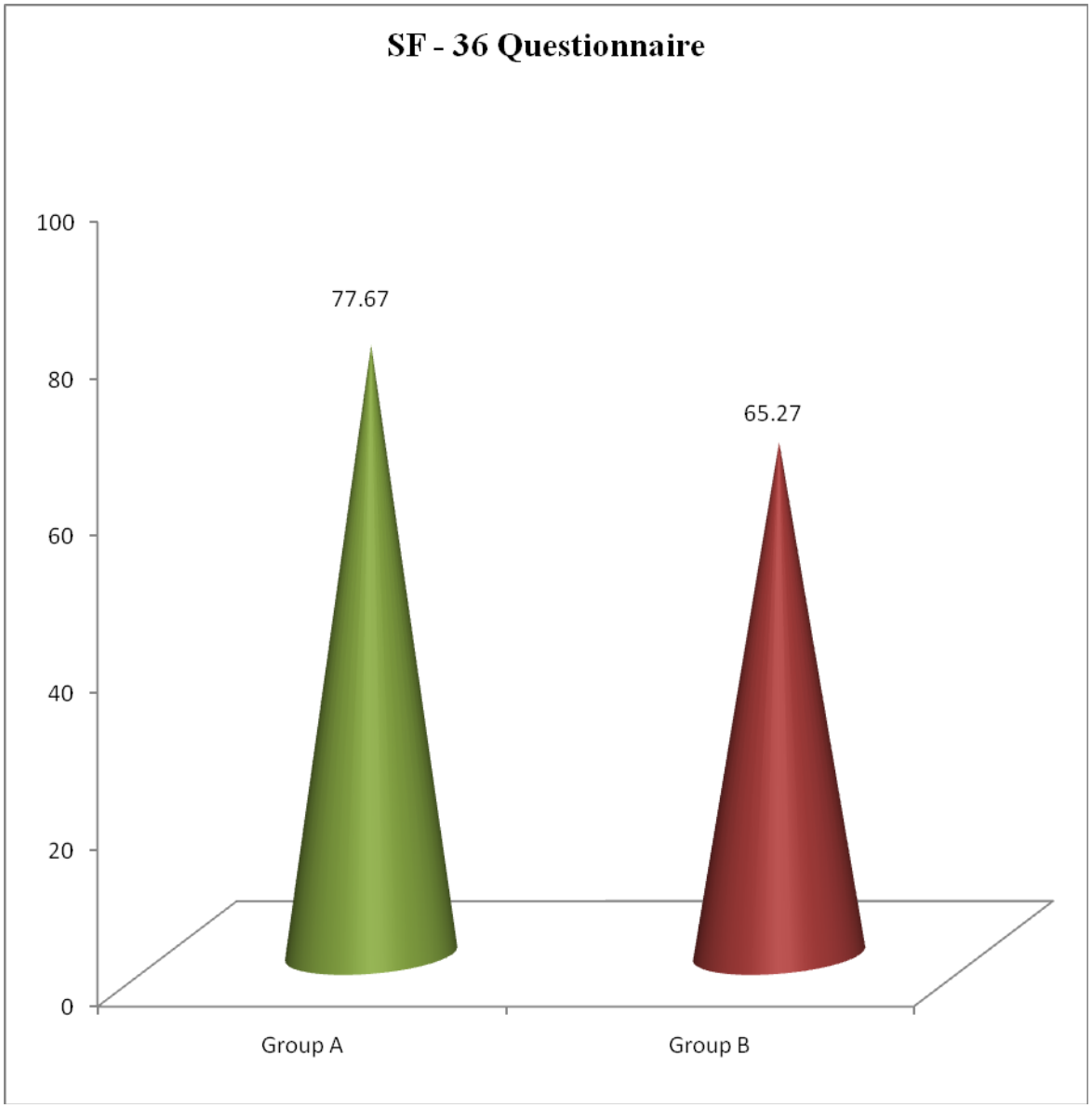
4.9. B ANALYSIS OF RESULT

Using unpaired 't' test

Comparing post test values of SF- 36 Questionnaire in Group A Group B. Calculated 't' value (3.4774) is greater than table value (1.761) at 5% level significance for two tailed 't' test showing that there is significant difference between two groups.

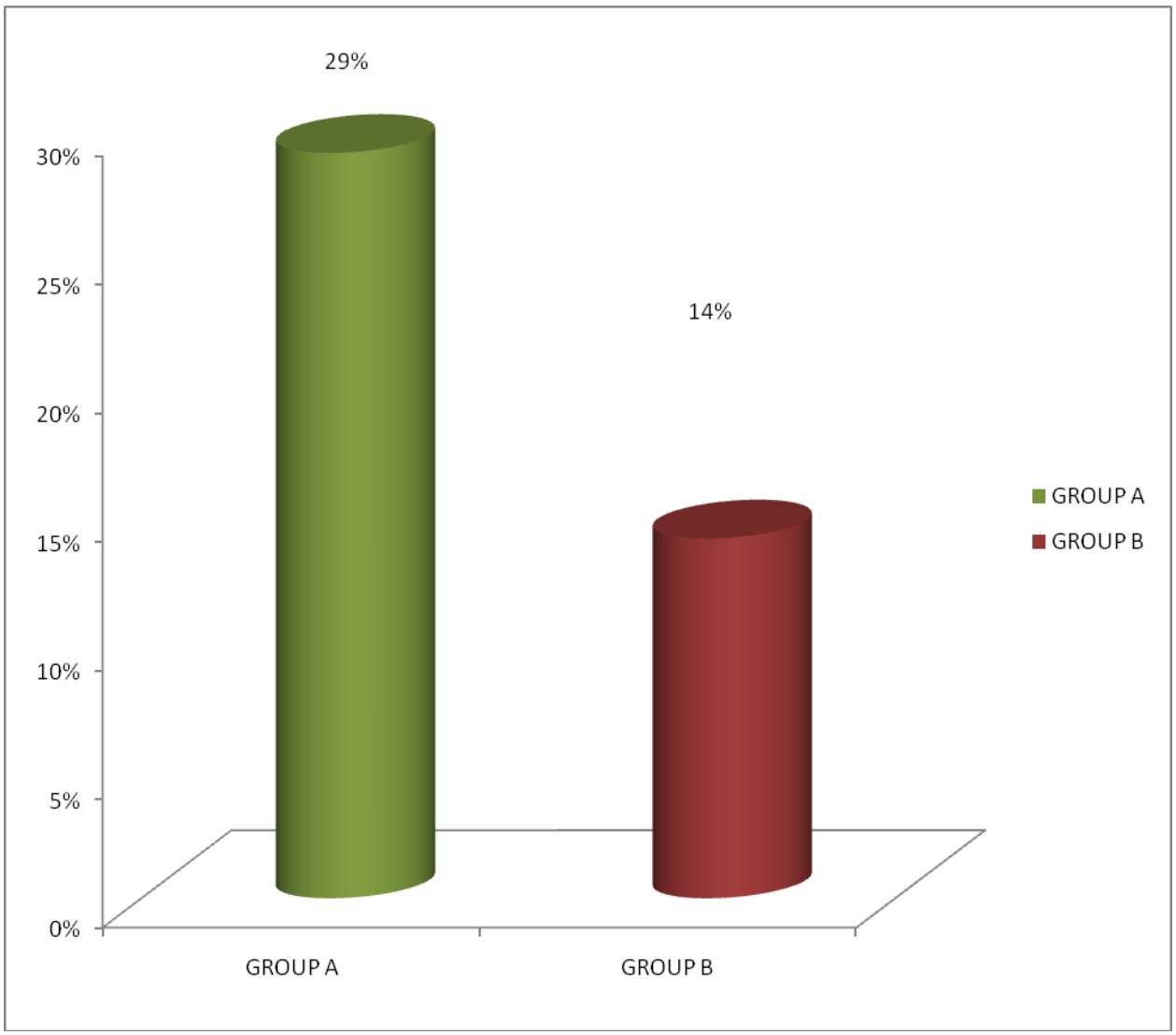
4.9.C. GRAPH- 12

GRAPHICAL REPRESENTATION OF POST TEST VALUES OF GROUP A & GROUP B



GRAPHICAL REPRESENTATION OF PERCENTILE DIFFERENCE IN QUALITY OF LIFE FOR GROUP A AND GROUP B PATIENTS.

GRAPH - 13



V DISCUSSION

Purpose of this study was to indicate that a hold relax technique specifically to the pectoralis major muscle is capable of increasing the outcome measures which are shoulder horizontal extension range of motion and Quality of Life in COPD patients who have already completed pulmonary rehabilitation programme which involves aerobic training and strength training. According to **Kjensli et al.,(2009)**, Bone mineral density decreases with advancing chronic obstructive pulmonary disease (COPD) severity increases and which results in deformities like kyphosis or barrel chest deformity.

Previous studies have found that a hold relax technique in normal subjects can produce statically significant increased hemodynamic changes namely, systolic and diastolic blood pressure, as rate of perceived exertion, respiratory rate,SaO2 were not adversely affected in any subjects after intervention, this implies that the treatment is a safe method of treatment in chronic respiratory patients.

COPD being a systemic disease, not only affects the lungs but also the peripheral muscle system. These abnormal changes occurring in the peripheral muscles are attributed to decrease oxygen delivery, disuse atrophy, malnourishment and other co-morbidities that has a negative correlation with the overall health status**.(Jennifer.D.Paratz Aim Congress of Rehabilitation Medicine 2008).**

An each number of interventions to countermeasure the weakness in peripheral muscles are commonly use, but secondary postural deformities can occur in response to hyperinflation and increased work of breathing. Probable postural changes include elevated, protracted or abducted scapulae with medially rotated humerus, kyphotic spinal deformities.

Pectoralis major is placed in a shortened position due to hyperinflation which tends to increase the resistance of the chest wall, which further increases the work of breathing and demand placed on respiratory muscles**(Mac Intyre NR.Respiratory care 2006).** With progression of disease, the upper limb usage for functional tasks becomes increasingly difficult. This eventual disuse of upper limb leads to tightening of muscle and stiffness around the muscle quadrant further increasing chest wall resistances and once again work of breathing.

According to **Keber in journal Kinesol 2002,** various recommendations for management of chronic respiratory disease includes musculoskeletal techniques which aims at increasing muscle flexibility such as passive stretching ,self stretching contraction of agonist against resistance, passive joint mobilization and massage.

The active method of treatment included in this study appears to be safe and effective in chronic respiratory patients disease .**Wang et al.,(2010)**found that the

cumulative effect of proprioceptive neuromuscular facilitation was more beneficial than immediate effects.

Considering the above discussions in the literature this study was aimed to show that stretching technique based on PNF will be able to increase Range Of Motion of shoulder Horizontal Extension and Quality Of Life in this targeted population of chronic COPD patients who have completed pulmonary rehabilitation.

In this study, a total of 30 patients with secondary postural deformity following COPD, who full fill the inclusive criteria were selected and randomized into two groups with 15 patients in each Group. Group A underwent hold-relax technique and Group B control group underwent free exercises to shoulder.

An optimal treatment programme involves for minimum 20 minutes, 10 minutes to right side and 10 minutes to left side. According to **Briggler et al., (1997)** this stretching should includes 30 seconds,15 seconds hold and 5 seconds relax. The results of this study indicate that a hold and relax technique specifically to the pectoralis major is capable of increasing both ROM, thus improving the restrictive component of COPD.

VI RESULT AND CONCLUSION

This study was focused on analyzing the effects of hold – relax technique in improving the restrictive component of COPD , and extensibility of pectoralis major muscle and possibly overcome some of the postural change of COPD . About 30 subjects after fulfilling the inclusive criteria were divided into experimental and control group with 15 subjects in each group .

Experimental group subjects underwent hold – relax technique and control group underwent free exercises . Based on statistical analysis , Student 't' test at 5% level of significance P value is less than 0.05 and calculated value is greater than the tabulated value thereby showing significant improvement in shoulder extension range of motion and quality of life .

The demographic representations of the groups are given in Table I(Pg-30). Age group of the participants varies from 40 years to 55 years and about 20 % from 40—43 years, 23% from 44—47 years, 33% from 48—52 years and 24% from 53—55 years.

The first Paired 't' test analysis for the pre test and post test variable for measuring ***the Right Shoulder horizontal extension range of motion*** in Group A and Group B is shown in Table II(pg-32) and III(pg-34). Both the groups shows a significant difference between the pre test and post test values. The 't' value for the

Group A is 16.58 the 't' value for the Group B is 15.28 and it shows a significant percentile difference of 64% and 27% in Group A and B respectively.

The Paired 't' test analysis for the pre test and post test variable for measuring ***the Left Shoulder horizontal extension range of motion*** in ***Group A and Group B*** is shown in table V(pg-39) and VI(pg-41). Both the groups shows a significant difference between the pre test and post test values. The 't' value for the Group A is 22.20 the 't' value for the Group B is 21.37 and it shows a significant percentile difference of 53% and 26% in Group A and B respectively.

The unpaired 't' test analysis for the Post test variables for ***Both groups*** for the ***Shoulder horizontal extension Range Of Motion*** is shown in the table IV(right side)(pg-36) and table VII(left side)(pg-43). There was a significant difference shown between the Groups. Group B subjects show improvement than Group A. The 't' value for the post test variables for both groups is 4.1583 (Right shoulder ROM) and 4.1275(Left shoulder ROM)

The second Paired 't' test analysis for the pre test and post test variable for measuring ***the Quality of Life*** in ***Group A and Group B*** is shown in table VIII(pg-45) and IX(pg-47). Both the groups shows a significant difference between the pre test and post test values. The 't' value for the Group A is 13.048

the ‘t’ value for the Group B is 11.521 and it shows a significant percentile difference of 29% and 14% in Group A and B respectively.

The unpaired ‘t’ test analysis for the Post test variables for ***Both groups*** for the ***Quality of Life*** is shown in the table X(pg-50). There was a significant difference shown between the Groups. Group B subjects show improvement than Group A. The ‘t’ value for the post test variables for both groups is 3.4774

This study therefore rejects the null hypothesis and accepts the alternate hypothesis . Compared to Group B : Group A showed significant improvement in shoulder horizontal extension range of motion and quality of life in subjects with chronic COPD .

This study concluded that hold – relax technique , based on PNF given to chronic COPD patients having secondary postural deformity reversed the effect of tight chest wall muscles by increasing shoulder horizontal extension range of motion and this in turn helped the subjects in improving their quality of life .

VII. LIMITATIONS AND RECOMMENDATIONS

LIMITATIONS:

- ✓ FEV1 , FVC were not measured in order to indicate the severity of COPD in each subjects .
- ✓ Influence of drugs , climate and psychological factors cannot be controlled .
- ✓ The sample size in my study was small .
- ✓ Only COPD patients with secondary postural deformities were focused in this study .
- ✓ Restriction of shoulder horizontal extension was the only focused symptom in this study .
- ✓ Follow up of subjects after treatment duration was not done .
- ✓ Chest expansion and vital capacity are not focused on this study

RECOMMENDATIONS

- ✓ Other secondary postural deformities in COPD patients should be focused
- ✓ The study can be done with larger samples .
- ✓ This study can be done on secondary postural deformities due to chronic respiratory diseases other than COPD .

- ✓ PNF technique combined with thoracic expansion exercises are recommended in the future studies.
- ✓ This study also can also be performed using other outcome measures.

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IX.APPENDIX

APPENDIX I

CONSENT FORM

This is to certify that I _____ freely and voluntarily agree to participate in the study **"A STUDY TO ANALYSE THE EFFECTS OF HOLD RELAX TECHNIQUE IN INCREASING SHOULDER RANGE OF MOTION AND QUALITYOF LIFE IN CHRONIC COPD PATIENTS HAVING SECONDARY POSTURAL DEFORMITIES."**

I have been explained about the procedures and the risks that would occur during the study.

Participant:

Witness:

Date:

I have explained and defined the procedure to which the subject has consented to participate.

Researcher: Date:

APPENDIX- II

(CARDIO PULMONARY ASSESSMENT)

DEMOGRAPHIC DATA:

Name: Age:

Sex:

Occupation: Date of admission:

Height: Date of assessment:

Weight:

Present complaints:

HISTORY

Past medical history:

Present Medical history:

Family history:

Social history:

Associated problems:

Vital signs:

Blood pressure:

Respiratory rate:

Heart rate:

Temperature:

OBJECTIVE ASSESSMENT:

On observation:

Built:

Color:

Chest shape:

Symmetry:

Breathing pattern:

Respiratory rate:

Chest movement:

Intercostals retraction:

Periphery/extremities:

Clubbing:

Cyanosis:

Edema:

Respiratory distress:

Type of respiration:

Usage of accessory muscles:

Vocal fremitus:

On palpation:

Tracheal deviation:

Chest expansion

Axillary level :

Nipple level:

Xiphoid level:

Tenderness

Edema

On examination:

On auscultation

Lung sounds:

Breath sounds:

Heart sounds

Percussion:

Investigation

X-ray:

ECG:

Echocardiogram:

ABG analysis:

Blood test:

Exercise tolerance:

Diagnosis:

APPENDIX- III

SPIROMETRIC CLASSIFICATION OF COPD (ATCS GRADING)

Stage I: Mild FEV1/FVC < 0.70

FEV1 ≥ 80% predicted

Stage II: Moderate FEV1/FVC < 0.70

50% ≤ FEV1 < 80% predicted

Stage III: Severe FEV1/FVC < 0.70

30% ≤ FEV1 < 50% predicted

Stage IV: Very Severe FEV1/FVC < 0.70

FEV1 < 30% predicted or FEV1 < 50%

predicted plus chronic respiratory

failure

APPENDIX-IV

SF-36 QUESTIONNAIRE

Name:_____ Ref. Dr:_____ Date: _____

ID#: _____ Age: _____ Gender: M / F

Please answer the 36 questions of the **Health Survey** completely, honestly, and without interruptions.

GENERAL HEALTH:

In general, would you say your health is:

Excellent Very Good Good Fair Poor

Compared to one year ago, how would you rate your health in general now?

Much better now than one year ago

Somewhat better now than one year ago

About the same

Somewhat worse now than one year ago

Much worse than one year ago

LIMITATIONS OF ACTIVITIES:

The following items are about activities you might do during a typical day. Does your health now limit you in these

activities? If so, how much?

Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.

Yes, Limited a lot Yes, Limited a Little No, Not Limited at all

Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf

Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Lifting or carrying groceries

Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Climbing several flights of stairs

Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Climbing one flight of stairs

Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Bending, kneeling, or stooping

Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Walking more than a mile

Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Walking several blocks

Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Walking one block

Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Bathing or dressing yourself

Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

PHYSICAL HEALTH PROBLEMS:

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as

a result of your physical health?

Cut down the amount of time you spent on work or other activities

Yes No

Accomplished less than you would like

Yes No

Were limited in the kind of work or other activities

Yes No

Had difficulty performing the work or other activities (for example, it took extra effort)

Yes No

EMOTIONAL HEALTH PROBLEMS:

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as

a result of any emotional problems (such as feeling depressed or anxious)?

Cut down the amount of time you spent on work or other activities

Yes No

Accomplished less than you would like

Yes No

Didn't do work or other activities as carefully as usual

Yes No

SOCIAL ACTIVITIES:

Emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

Not at all Slightly Moderately Severe Very Severe

PAIN:

How much bodily pain have you had during the past 4 weeks?

None Very Mild Mild Moderate Severe Very Severe

During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the

home and housework)?

Not at all A little bit Moderately Quite a bit Extremely

ENERGY AND EMOTIONS:

These questions are about how you feel and how things have been with you during the last 4 weeks. For each

question, please give the answer that comes closest to the way you have been feeling.

Did you feel full of pep?

All of the time

Most of the time

A good Bit of the Time

Some of the time

A little bit of the time

None of the Time

Have you been a very nervous person?

All of the time

Most of the time

A good Bit of the Time

Some of the time

A little bit of the time

None of the Time

Have you felt so down in the dumps that nothing could cheer you up?

All of the time

Most of the time

A good Bit of the Time

Some of the time

A little bit of the time

None of the Time

Have you felt calm and peaceful?

All of the time

Most of the time

A good Bit of the Time

Some of the time

A little bit of the time

None of the Time

Did you have a lot of energy?

All of the time

Most of the time

A good Bit of the Time

Some of the time

A little bit of the time

None of the Time

Have you felt downhearted and blue?

All of the time

Most of the time

A good Bit of the Time

Some of the time

A little bit of the time

None of the Time

Did you feel worn out?

All of the time

Most of the time

A good Bit of the Time

Some of the time

A little bit of the time

None of the Time

Have you been a happy person?

All of the time

Most of the time

A good Bit of the Time

Some of the time

A little bit of the time

None of the Time

Did you feel tired?

All of the time

Most of the time

A good Bit of the Time

Some of the time

A little bit of the time

None of the Time

SOCIAL ACTIVITIES:

During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with

your social activities (like visiting with friends, relatives, etc.)?

All of the time

Most of the time

Some of the time

A little bit of the time

None of the Time

GENERAL HEALTH:

How true or false is each of the following statements for you?

I seem to get sick a little easier than other people

Definitely true Mostly true Don't know Mostly false Definitely false

I am as healthy as anybody I know

Definitely true Mostly true Don't know Mostly false Definitely false

I expect my health to get worse

Definitely true Mostly true Don't know Mostly false Definitely false

My health is excellent

Definitely true Mostly true Don't know Mostly false Definitely false

APPENDIX-V

INTERVENTION

- ✓ -Subject was asked to move their arm in agonist direction
- ✓ -Subject was then asked to contract the pectoral muscles to move the limb in antagonist direction.(glenohumeral horizontal extension, 90 degree of glenohumeral abduction and external rotation glenohumeral rotation with elbow bent)
- ✓ -This isometric contraction was held for 15 seconds and then the patient then relaxed for next 5 seconds.
- ✓ -Then the passive stretch in the opposite direction was applied.

APPENDIX – VI

DATA COLLECTION

RIGHT SHOULDER HORIZONTAL EXTENSION MOVEMENT

GROUP-A

S.NO	PRE TEST	POST TEST
1.	13	28
2.	15	29
3.	12	26
4.	16	26
5.	14	25
6.	18	30
7.	15	30
8.	20	28
9.	17	33
10.	23	32
11.	24	35
12.	18	34
13.	24	32
14.	25	36
15.	25	35

LEFT SHOULDER HORIZONTAL EXTENSION MOVEMENT

GROUP-A

S.NO	PRE TEST	POST TEST
1.	25	30
2.	29	31
3.	27	32
4.	21	26
5.	24	27
6.	26	31
7.	28	31
8.	19	28
9.	23	27
10.	21	25
11.	25	27
12.	25	33
13.	18	34
14.	17	27
15.	14	29

LEFT SHOULDER HORIZONTAL EXTENSION MOVEMENT

GROUP-A

S.NO	PRE TEST	POST TEST
1.	25	30
2.	29	31
3.	27	32
4.	21	26
5.	24	27
6.	26	31
7.	28	31
8.	19	28
9.	23	27
10.	21	25
11.	25	27
12.	25	33
13.	18	34
14.	17	27
15.	14	29

QUALITY OF LIFE

GROUP-A

S.NO	PRE TEST	POST TEST
1.	55	75
2.	45	60
3.	70	85
4.	75	89
5.	65	79
6.	60	78
7.	50	70
8.	38	58
9.	70	83
10.	72	87
11.	67	89
12.	65	79
13.	58	80
14.	55	78
15.	52	75