

# Effect of Progressive Resistance Exercise in Improving Muscle Power, Range of Motion and Balance in Female Elders in Rural Community

Kamalanathan<sup>1</sup>, K. Elangovan<sup>2</sup>, Prof. V. P. R Sivakumar<sup>3</sup>

<sup>1</sup>Associate Professor, SRM College of Physiotherapy, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu, India

<sup>2</sup>SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu, India

<sup>3</sup>Dean, SRM College of Physiotherapy, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu, India

## Abstract

**BACKGROUND:** Falls in the elderly females living in rural community leads to more Mortality and morbidity in recent years. Exercises are important to minimize disability and to prevent falls in elderly. The primary mechanism responsible for most of these structural changes is a decrease in muscle power, cardio vascular changes and reduction in the number of neurons., Exercise is a medicine to prevent and minimize the above Physiological changes.

**OBJECTIVE:** To find out the effect of exercises in improving range of motion, Muscle power and balance in female elders in rural community.

**METHODS:** Quasi Experimental design, pre – post study type with 30 samples at Rural study Setting.

**RESULTS:** progressive resisted exercises improved range of motion, Muscle power and balance in female elders Significantly (P<0.005). **Conclusion:** Hence we concluded that the above study progressive resistance exercise gives a significant improvement in muscle power, range of motion and balance in hip knee and ankle for female elders.

**Key words:** progressive resistance exercise, female elders, muscle power, falls.

accidental deaths in persons over the age of 65 years. The central nervous system demonstrates many structural changes during the ageing process. The primary mechanism responsible for most of these structural changes is a decrease in the number of neurons. Also the size of the cerebellum decreases resulting in imbalance in elderly. Falls are more common in older females than in older males, the ratio being 2:1. Women's develop greater postural sway and imbalance than men and hence greater tendency to fall. Falls can be markers of poor health and declining function, and they are often associated with significant morbidity, more than 90% hip fractures occurs as a result of falls, with the most of these fractures occurring in person over 70 years of age. The risk factors for the fall in elderly include increase age, medication use cognitive impairment and sensory deficits. Many older people take medications that may make them dizzy or drowsy and some may have impaired balance and weaker muscles. These risk factors may all contribute to more frequent and serious falls. The fear of falling may make the elderly less active, this may cause them to exercise less and cause further weakness. In the community 30%-50% a people over 65 years of age fall each year. Falls are more common multiple, often interacting risk factors; relatively active, mobile elderly are at greater risk than frail elderly for some injury.

**Objective:-** To find out the efficacy of exercise in female elderly fall.

## I. INTRODUCTION

Falls is an event caused by age associated diseases, musculo-skeletal problems in association with physiological changes like impairment of sensory system. The incidence of fall increases with advancing age and it is one of the leading causes of death in elderly. The biological changes of ageing takes place in every system of an individual. In musculo-skeletal system, the ageing is accompanied by the loss of muscle mass and the bone tissue and the rate of mineralization also slowdown. Consequences of declines in muscle function in old age people are loss of muscle strength and endurance, reduction in ability to perform ADL'S, change in balance and gait; this leads to increase fall risk; 25% of falls results in serious problems. Typically we lose about 23% of our muscle mass as both the number and size of muscle fibers decrease. Falls are the leading cause of injury related visit to emergency departments and primary cause of

## II. METHODOLOGY

**Study Setting:-** Melamaiyur village Vallam post Chengalpet.

**Study Design:** Experimental study.

**Sample Size:-** 30 subjects.

**Inclusion Criteria:-** Age 65 -75 years, elderly Sex: female .Ability to walk without assistance, to perform normal activities of daily living, less than 3 incidence of fall within one year.

**Exclusion Criteria:** pneumonia, Neurological disorders Psycho-somatic problems, Recent fracture and dislocation,

Uncontrolled diabetes, Loss of vision More than three incidence of fall in a year.

**Materials Used In The Study:-**Goniometer, Balance and mobility scale MRC grading, Chair, Couch and Sand bag

#### *Procedure*

This is an quasi experimental study to prove the effect of exercises in range of motion, balance, and muscle power in female elderly. Thirty elderly women in the age group of 65 – 75 yrs were selected for the study based on inclusion criteria . prior to participation , all subjects were informed and asked for consent form .All these subjects underwent pre and post test. All these 30 subjects received structured progressive resistance exercises for 12 weeks to improve their range of motion , balance and muscle power. Range of motion is assessed by using universal goniometer. Range of motion of hip is noted in side lying for both flexion and extension where the fulcrum is placed in the greater trochanter, movable arm is placed parallel to the femur and fixed arm parallel to the trunk. For abduction and adduction the patient in made to lie in supine and the fulcrum is anterior superior iliac spine and fixed arm will be parallel to the umbilicus and the movable arm parallel to the femur and the range of motion is

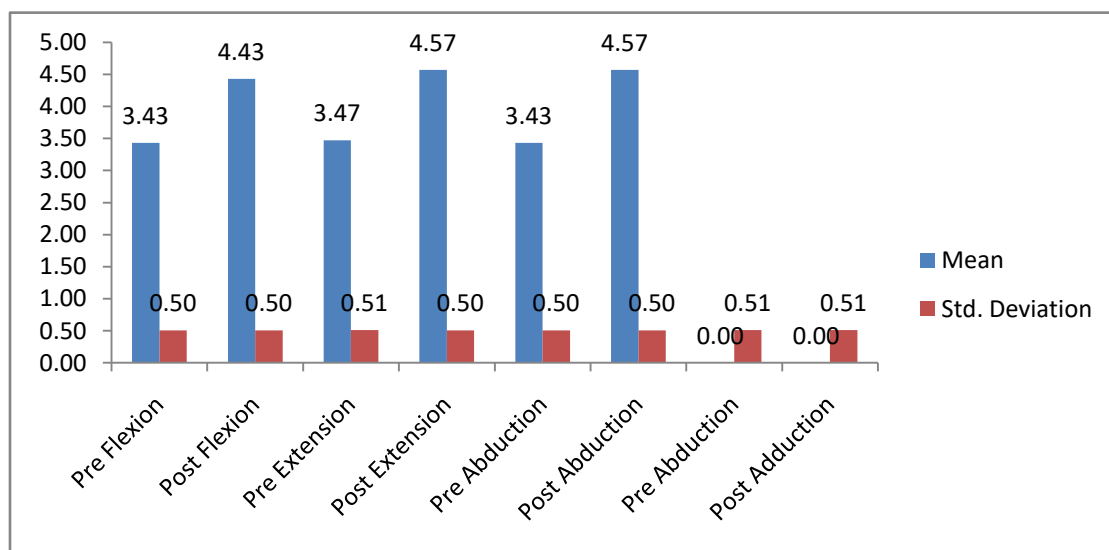
noted . Then for knee flexion and extension the patient is made to sit in high sitting and the fulcrum is lateral epicondyle of femur and the fixed arm is kept parallel to the femur and movable arm parallel to the leg. Manual muscle testing was performed for hip flexor in supine lying position. In prone lying hip extensor was performed .Manual muscle testing was performed for hip abductors in side lying position and for hip adductor manual muscle testing is performed in same position as abductors but to the opposite limb. Balance and mobility assessment was assessed by using Tinetti's balance and mobility scale. This scale consist of 16 scoring this questionnaire is given to the subject. post test will be conducted after 12 weeks.

### III. DATA ANALYSIS AND RESULTS

#### *MUSCLE POWER FOR HIP*

Table - 1 This table shows that there is a significant difference between the Pre and Post test of hip flexion, extension, abduction and adduction. The mean value of Pre and Post test and standard deviation of Pre-test and Post-test are highly significant.

	HIP m/s power	Mean	N	Std Deviation	t value	Significance Level
Pair 1	Pre Flexion	3.43	30	0.504	-14.748	0.000
	Post Flexion	4.43		0.504		
Pair 2	Pre Extension	3.47		0.507	-12.535	0.000
	Post Extension	4.57		0.504		
Pair 3	Pre Abduction	3.43		0.504	-17.954	0.000
	Post Abduction	4.57		0.504		
Pair 4	Pre Adduction	3.53		0.507	-12.543	0.000
	Post Adduction	4.53		0.507		



**MUSCLE POWER FOR KNEE**

Table- 2. This table shows that there is a significant difference between pre test and post test of flexion and extension of knee. The mean value of pre-test and post-test for knee

flexion are 3.47 and 4.53. The standard deviation of Pre-test and Post-test of knee flexion are 0.507 and 0.507. The mean value of Pre-test and Post-test for knee extension are 3.43 and 4.53. The standard deviation for knee extension for pre-test and post-test are 0.504 and 0.507

		Mean	N	Std. Deviation	t-Value	Significance Level
Pair 1	Pre Flexion	3.47	30	.507	-23.028	.000
	Post Flexion	4.53	30	.507		
Pair 2	Pre Extension	3.43	30	.504	-31.000	.000
	Post Extension	4.47	30	.507		

**MUSCLE POWER FOR KNEE.**

This bar shows the pre and post

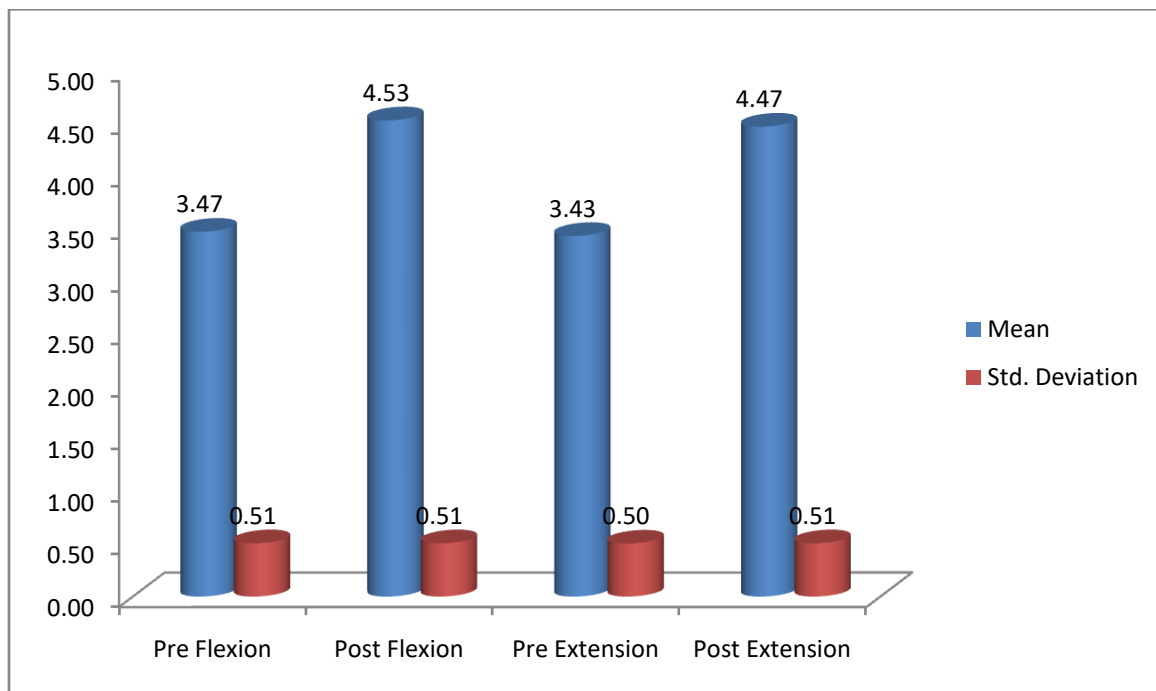
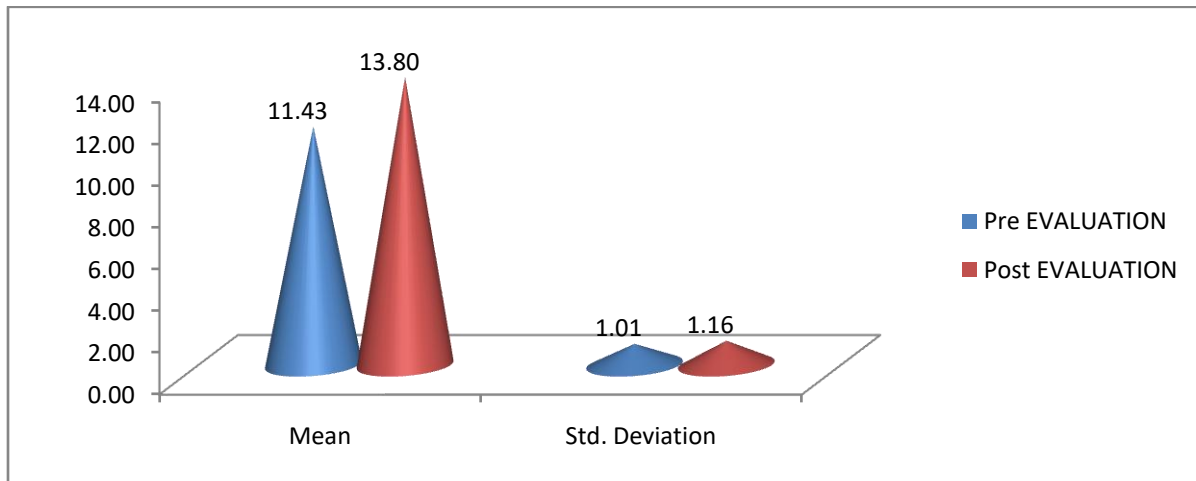
**BALANCE TEST**

Table – 3 This table 3 shows that there is a significance difference between Pre-test and Post-test of p value of 0.000.

The mean value from Pre-test and Post-test are 11.43 and 13.80. The standard deviation is 1.006 and 1.157.

		Mean	N	Std. Deviation	t-Value	Significance Level
Pair 1	Pre EVALUATION	11.43	30	1.006	-18.044	.000
	Post EVALUATION	13.80	30	1.157		



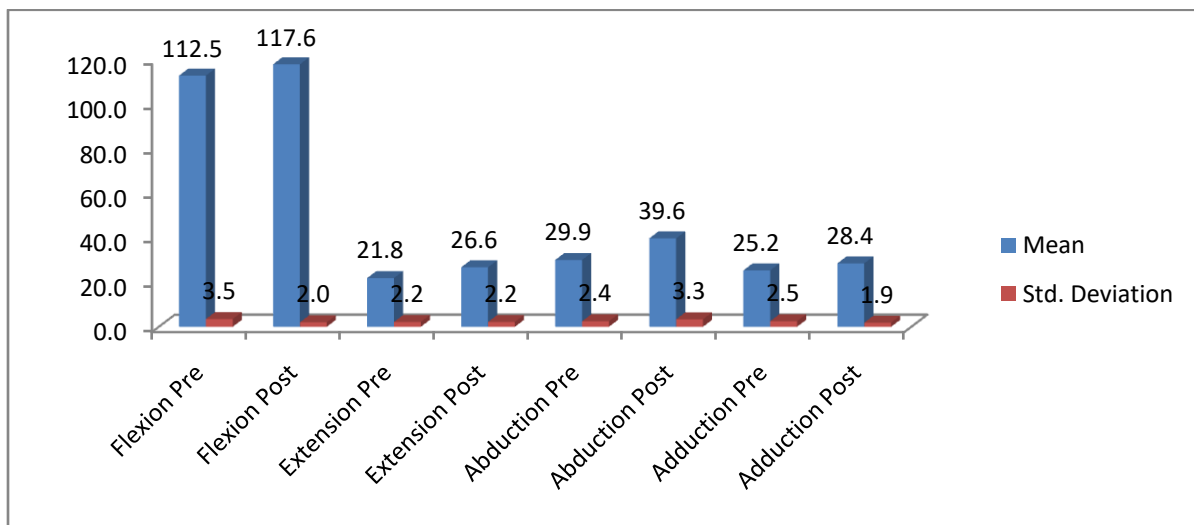
This bar shows the pre and post evaluation for BALANCE

#### RANGE OF MOTION- HIP

Table -4

		Mean	N	Std. Deviation	t-Value	Significance Level
Pair 1	Flexion Pre	112.50	30	3.452	-11.021	.000
	Flexion Post	117.57	30	1.995		
Pair 2	Extension Pre	21.80	30	2.156	-25.136	.000
	Extension Post	26.63	30	2.173		
Pair 3	Abduction Pre	29.93	30	2.449	-16.554	.000
	Abduction Post	39.60	30	3.338		
Pair 4	Adduction Pre	25.23	30	2.501	-11.660	.000
	Adduction Post	28.40	30	1.850		

Bar shows the RANGE OF MOTION FOR HIP pre test and post test



The table 4 shows that there is a significance difference between Pre-test and Post-test for Hip range of motion. The significance value p is 0.000

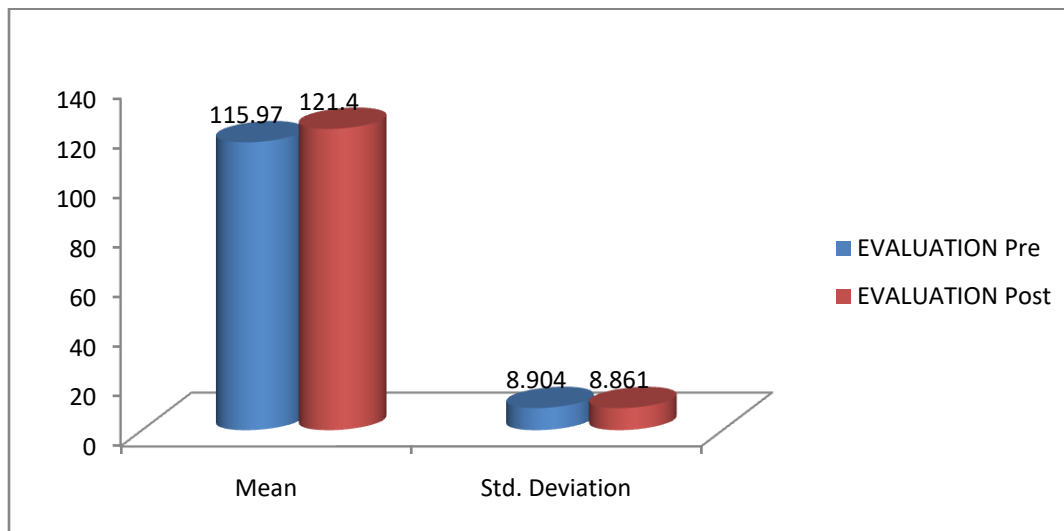
*RANGE OF MOTION - KNEE*

Table – 5

		Mean	N	Std. Deviation	t-Value	Significance Level
Pair 1	EVALUATION Pre	115.97	30	8.904	-30.635	.000
	EVALUATION Post	121.40	30	8.861		

Difference (  $P < 0.05$  )

The table 2 shows that there is a significance between Pre-test and Post-test of p value is 0.000.



Bar shows the RANGE OF MOTION FOR KNEE pre test and post test

#### IV. DISCUSSION

This study found out the exercise protocol could be most efficient to improve the muscle power, range of motion and balance gain following the suggestions by **BAKER & M CALINDOR** reported that the mechanism of exercise remains unclear and deserves further study to determine the effectiveness. After screening, the patients were assessed according to **CIPRIANO** who reported that a full history constitutes one of the most important aspects of clinical evaluation protocol. Clinical history was directly collected in a pre-physiotherapeutic treatment evaluation; which is also followed in this study. Falls more common in older females than in older males, the ratio being 2:1. Women develop greater postural sway and imbalance than men and hence greater tendency to fall. This study evidenced that the therapy using only kinesiotherapy presented positive results for muscle power gain as opposite describing that therapeutic exercise in elderly women with history of falls improve muscle power and functional activity. Muscle strength evaluation is an important technique to diagnose disease etiology and to determine and assess rehabilitation strategies. Traditionally, muscular strength has been evaluated by means of manual muscular test, and this technique has been criticized due to its subjective nature. Range of motion showed a

positive results when pre and post test treatment phase were compared. Balance becomes a function which is assured and taken for granted. It depends on the integrative functioning of many factors like visual, vestibular, proprioceptive, exteroceptive and tactile sources. According to **WOLTSON** et al the motor, sensory and central integrative systems are involved in maintaining balance and postural control integration occur at multiple levels in the CNS. The progressive resisted exercise gives a significant improvement ( $p = 0.000$ ) in improving muscle power, range of motion and balance in female community elders.

#### V. CONCLUSION

These exercises are safe, reliable, cost effective and treatment by self with preventive self care strategies. With thorough instructions and weekly reminders, adherence to the exercise programs was generally good over a period of 2 month. Hence we concluded that the above study progressive resistance exercise gives a significant improvement in muscle power, range of motion and balance in hip knee and ankle for female elders.

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