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## A STUDY ON EFFECT OF TWO DIFFERENTIAL EXERCISES PROTOCOL TO PREVENT FALL IN ELDERLY

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### ABSTRACT

**Objectives:** The main objective of this study is to compare the effectiveness of balance exercises in elderly. **Design:** Comparative Pre test and post test experimental design. **Setting:** Total 30 elderly subjects were taken from old age home, Surat. And given two different exercises protocol. **Participants:** A sample of 30 elderly were taken from after giving due consideration to inclusion and exclusion criteria. Informed consent was taken from each subject before starting. **Intervention:** Total 30 Group 1: Exercises to 15 subjects with Single leg standing, Tandem walking, Walking in “fig of 8” Beam walking, Group 2: Exercises to 15 subjects with Walk : Sideways, Normal Standing with Reaching Activities, Weight Shifting : side-to-side, forward-to-backward, Full Tandem Standing. **Measurements:** Tinetti Performance Oriented Mobility Assessment tool<sup>4</sup> was used. **Results:** Both Group 1 and Group 2 results showed highly significant improvement in balance after 4 weeks of exercise at 5% level of significance. There was more improvement in balance in group-1 than group – 2 at 5% level of significance. **Conclusion:** From the present study it can be concluded that different protocols of regular exercises improves the balance and prevent fall in elderly.<sup>9</sup>

**Key words:** Balance, Tinetti Performance Oriented Mobility Assessment and Exercises

### INTRODUCTION

Ageing refers to biological process of growing older in a deleterious sense. The chronological criterion to identify the old in America has been set at 65 years. However, the onset of health problems of elderly may occur in early 50s or may be only in 40s. The present chronological criterion to identify the old may change in future, as the mean age of population increases each decade and more individuals live in to their ninth decades. Elderly are further classified as: Young Old: 65-75 years. Middle-old:

75-85 years; Old: old > 85 years. Balance is a state of equilibrium characterized by cancellation of all forces by equal opposing forces. Balance is a set of biological strategies designed to maintain the body in erect posture. Balance and coordination depend on the interaction of multiple body organs and systems including eyes, brain and nervous system, cardiovascular system and muscles. There are mainly three mechanisms responsible for maintaining balance. Under normal circumstances, the body undergoes oscillation around a fixed point. As balance mechanisms deteriorate with increasing age, sway increases. **Ocular Mechanism:** - Under normal circumstances, visual cues are constantly

used to correct minor deviation from the fixed point. **Vestibular Mechanism:** - The vestibular is mainly involved with rotator movements of the head and neck, whereas the eolith organ is involved with acceleration and deceleration. **Proprioceptive Mechanism:** - Position sense is important for maintaining balance.<sup>3</sup> Sensory information from proprioceptors in the spine and major weight-bearing joints may be impaired with ageing and arthritis. Failure of these mechanism leads to an increased likelihood of falls.<sup>15</sup> Age and lack of physical activity may both be responsible for a poor balance control. The risk of developing problems in one or more of the sensory, motor, or adaptive brain components of balance increases with age as the body is exposed to degenerative or infectious diseases, or the effect of injuries accumulated over a lifetime. Thus, balance problems among older adults are frequently caused by combinations of subtle degenerative, infectious or injury processes that individually are not clinically significant. Poor balance has repeatedly being shown to be a risk factor for falls in community-dwelling older adults. Balance has three basic dimensions-maintenance of a position, stabilization for voluntary movements and reaction to external disturbances. Most injurious falls occur during the performance of routine daily activities such as walking, transferring, stopping, bending or reaching.

## METHODS

### Study design:

This study design was a purposive controlled trial pre test and post test experimental design.

### Sample size & sampling method:

Thirty subjects of 65 years or above were selected by means of simple random sampling procedure.

### Study population:

The subjects who fulfilled the following criteria were taken as study population.

### Inclusion Criteria:

Subjects of 65 years of above of both sexes were taken for the study.

### Exclusion Criteria:

Subjects with History of impairment of hip, thigh and knees, Recent fracture or any injury to lower limb, Inflammatory condition to lower limb, Sensory Deficits, Previous surgery to cranium, spine or lower limb, Hyper mobility to ankle and knee joint, Rheumatoid arthritis, Any neurological problem, Amputation or severe pain in the lower limb.<sup>7</sup>

### Sampling Technique & Sample Size

All subjects who fulfilled the inclusion criteria were selected for the study which counts to a total of 30.

### Study setting:

This study was conducted from 1<sup>st</sup> June' 09 to 30<sup>th</sup> June' 09 at Shree B.G. Patel, College of Physiotherapy, Anand and Old Age Home, Surat.

### Data Collection Method:

Balance of all the subjects was measured on 1<sup>st</sup> day and on 30<sup>th</sup> day by Tinetti test.

### Group Allocation:

#### The experimental group – 1:

This group was treated with following exercises two times a day for 30 consecutive days. Single leg standing, Tandem walking, walking in "fig of 8" Beam walking.<sup>12, 17</sup>

#### The experimental group – 2

This group was treated with following exercises two times a day for 30 consecutive days. Walk: Sideways, Normal Standing with Reaching Activities, Weight shifts: side-to-side, forward-to-backward, Full Tandem Standing.

Material: Tinetti Balance Assessment tool, Standard Chair without Armrest, Paper, Pen, Pencil, Chock, Scale, Measure tape, Stop Watch, Beam

### Outcome measures:

Tinetti Performance Oriented Mobility Assessment tool was used to measure an older adult's gait and balance abilities.<sup>4</sup>

#### **Collection of Data**

All subjects were selected randomly for two experimental groups after screening them for inclusion and exclusion criteria. All the subjects evaluated by Tinetti balance and gait assessment scale before and after the intervention.<sup>10</sup> Informed consent were taken from each subjects before starting the treatment, the subject was positioned comfortably and assessed thoroughly about their condition. The experimental group 1 :- This group was treated with following exercises two times a day for 30 consecutive days-Single leg standing with 30 second holding time, 5 repetitions for each side; Tandem walking on the path of 5 meters, 3 rounds; Walking in "fig. of 8" manner, 5 rounds; Beam (length: 93", height: 3.5") walking, 3 rounds.

The experimental group 2 :- This group was treated with following exercises two times a day for 30 consecutive days-Walk : Sideways, on path of 20 meters 2 rounds; Normal Standing with Reaching Activities, 30 repetitions; Weight Shifting : side-to-side, forward-to-backward, 20 times for both; Full Tandem Standing, 30 second holding time, 5 repetitions.

Tinetti Performance Oriented Mobility Assessment (T-POMA): The Tinetti assessment tool is an easily administered task-oriented test that measures an older adult's gait and balance abilities. The equipment needed is hard armless chair, Stopwatch or wristwatch and 15ft walkway.<sup>14</sup> Total time to complete task is 10-15 minutes. Scoring: A three-point ordinal scale<sup>13</sup>, ranging from 0-2. "0" indicates the highest level of impairment and "2" the individual's independence. Total Balance Score is 16; Total Gait Score is 12 and Total Test Score is

28. Interpretation: 25-28 = low fall risk 19-24 = medium fall risk < 19 = high fall risk.<sup>12</sup>

#### **DISCUSSION**

Results of the present study showed that there was a significant improvement in outcome measures of balance in both groups. ( $t_t = 1.7010$   $t_c = 5.6022$ ). We reject the null hypothesis and accept the alternative hypothesis as difference was seen in balance performance in group-1 and group-2 after giving balance training for 30 consecutive days ( $t_c > t_t$ ). When comparing two groups, there was more improvement in balance in group-1 is treated by balance exercises like Single leg standing, Tandem walking, Walking in "fig. of 8" and Beam walking than group - 2 which is treated by Side walking, Standing with Reaching Activities, Weight Shifting : side-to-side, forward-to-backward, Full Tandem Standing for 30 consecutive days. The reason for significant difference may be that Proprioception will increase with these balance exercises.<sup>11</sup> This is supported by the study done by, Gerome C. Gauchard, et.al. (2003) who concluded that proprioceptive exercises appear to have the best impact on balance regulation and precision. Besides, even if bioenergetics activity improves postural control<sup>19</sup> in simple tasks, more difficult postural tasks show that this type of activity does not develop a neurosensorial. Proprioceptive input threshold as well, probably an account of higher contribution of visual afferent. Secondly specific muscles which will help body to maintain balance will be trained through these exercises thus balance improves. This is also supported by the study done by, Kurt Murer, et.al. (2007) who concluded twice - weekly lower extremity strength training of 12 weeks duration in hostel - dwelling elderly and lower extremity physical function when additional functional exercises are added. The Tinetti Balance score and the chair

stand test of the physical performance assessment improved significantly. Thirdly, Subject in the training group reported feeling much comfortable after training and expressed a desire to continue the exercise. Finally, we found that age group of 65 years and above improve their performance significantly on one leg and were able to walk faster after 30 days training program.<sup>1</sup> Those subjects who had the lowest before training showed the most pronounced improvement and also subject in the training group – 1 will be improve static as well as dynamic stability after giving exercises in age group of 65 years and above.

### RESULTS

Total 30 subjects were randomly divided into 2 groups: Group 1 and Group 2. 15 subjects were taken in each group. All the statistical analysis was done with the help of Graph Pad Demo version. Graph 1, 2, 3 displays the group statistics of mean, group-1 Tinetti assessment tool and group-2 Tinetti assessment tool among the 30 subjects respectively. Student's t-test was applied. We reject the null hypothesis as no difference was seen in balance performance in group-1 and group-2 after giving balance training for 30 consecutive days. Significant difference in balance performance was seen at 5% level of significance.

### CONCLUSION

Thirty subjects of age 65 years and above participated in this study. Group-1 was given more of dynamic balancing exercises and group-2 was given more of static balancing exercises. Dynamic balancing exercises have more effect. The study shows improvement in balance performance of elderly persons after 30 days in both groups. But group-1 shows statistically significant improvement than group-2.

### ACKNOWLEDGMENTS

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**Conflict of Interest: None**

#### Ethical Committee Clearance

There was no ethical committee formed in the institution during the time in which research was performed.

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**INFORMED CONSENT**

Name:

Serial No:

Age:

Sex:

You are invited to participate in a study conducted by Abhishek Sharma and Jignesh Suthar, Shree B.G. Patel, College of Physiotherapy, Anand, Gujarat, India. We hope to learn what are effects of two different exercise protocols in improving balance. You were selected as a possible participant in this study because study deals with elderly subjects.

If you decide to participate ,we Abhishek Sharma and my colleagues will test the balance and do gait analysis, will teach two different exercise protocols to two different groups ,it will take one month to complete the study and was made to do twice a day for 30 days. There are chances of falls or injuries though less, there are chances of getting tired or you may get faint or may have serious cardio respiratory problems. We cannot guarantee, however that you will receive any benefits from this study.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law

If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without penalty.

If you have any questions, please ask us. If you have any additional questions later, Jignesh Suthar, Shree B.G. Patel, College of Physiotherapy, Anand will be happy to answer them

**YOU ARE MAKING A DECISION WHETHER OR NOT TO PARTICIPATE. YOUR SIGNATURE INDICATES THAT YOU HAVE DECIDED TO PARTICIPATE, HAVING READ THE INFORMATION PROVIDED ABOVE.**

**Date**

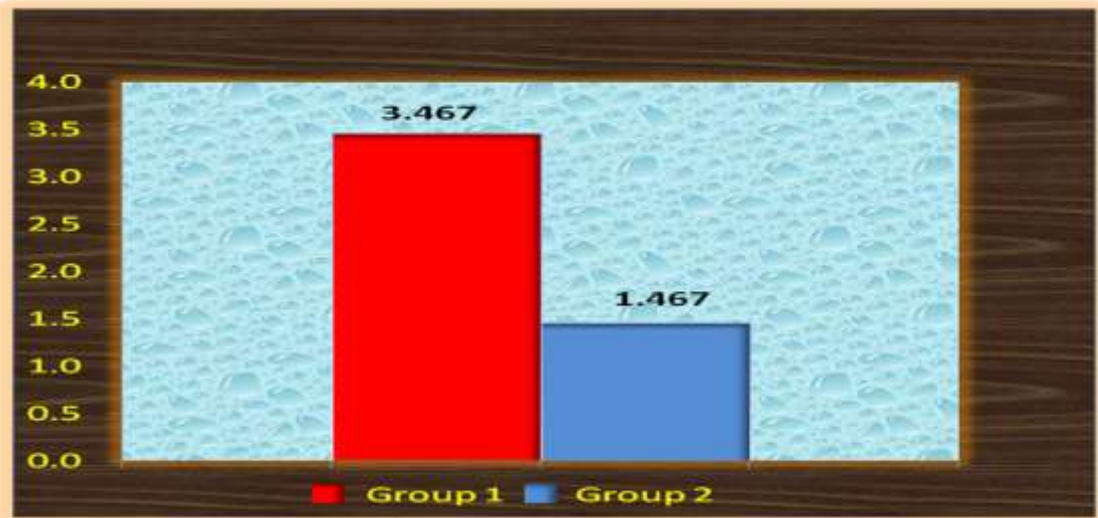
**Signature by  
Subject**

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**Signature of Witness (if any)**

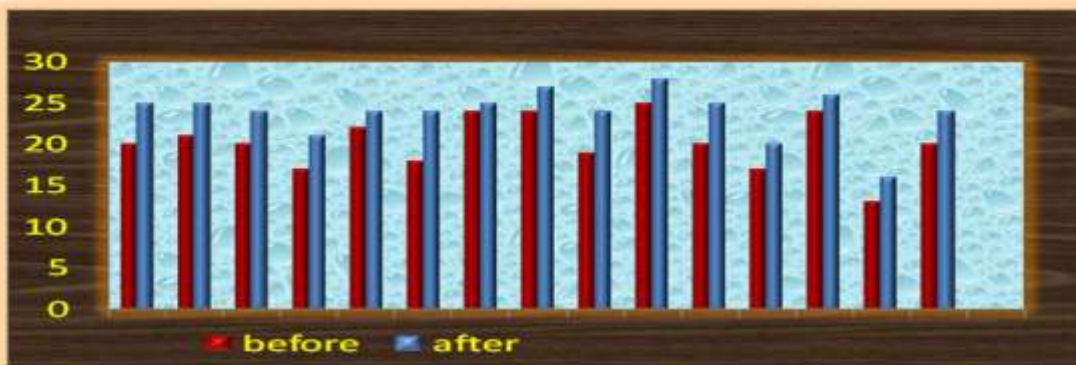
**Signature of Investigator**

**Graph-1: Means of Difference Tinetti Performance Oriented Mobility Assessment score from Day-1 to Day-30 of Group A and Group B**

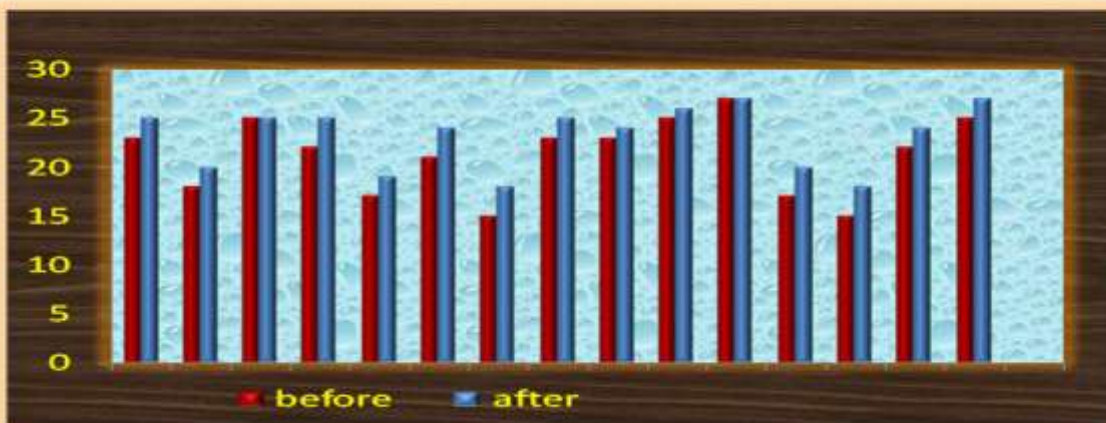


**Graph-2: Represents Pre and Post Exercise Tinetti Performance Oriented Mobility Assessment score for Group-1.**

**Graph-3: Represents Pre and Post Exercise Tinetti Performance Oriented Mobility Assessment score for Group-2.**



**Graph - 2**



**Graph - 3**