

## BALANCE CONTROL ABILITY IN FEMALE GERIATRIC POPULATION

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### **ABSTRACT**

**Background:** Balance is defined as the ability to maintain the center of body mass within a stability limit. In particular, in the case of the elderly, balance is an essential part of all functions in daily living, because such subjects have impaired balance and an increased risk of falling. In order to improve balance ability, many studies have adopted wide range of training methods involving physical balance training with visual biofeedback, muscle strength training, plyometric, virtual reality and mental training. Recently, Mental Training has been used in a range of fields as a motor learning method for acquiring and enhancing motor skills. **Aim and Objective:** To compare the effect of Mental Imagery and Physical Training in improving balance control ability of geriatric subjects. **Methodology:** A sample of convenience of 60 healthy asymptomatic female Geriatric subjects was recruited and randomly divided into two groups, i.e. Physical Training Group (PTG) and Mental Training Group (MTG) with 30 subjects in each group. PTG and MTG performed a dynamic balance task with physical and mental training, respectively, in a 30 min training session, 5 times a week for 3 weeks. **Results:** Demographic data were no significantly different among the group in terms of age, height and weight. At the baseline, there were no differences in the Global Balance score ( $p=0.12$ ) and Berg Balance Score ( $p=0.42$ ) in between the groups. At the post training test, the Global Balance Score significantly improved in Physical Training Group and Mental Training Group, compared to the pre-training test ( $p<0.000$ ). The Berg Balance Score ( $p<0.37$ ) did not significantly improve in Physical Training Group and Mental Training Group, compared to the pre-training test. **Conclusion:** From the results, it is concluded that, Physical training proved to be more effective than Mental Training in terms of Global Balance Score. **Key Words:** Balance, Berg Balance Scale, Mental Training, Mental Practice, Visual Biofeedback.

### **INTRODUCTION**

Balance is defined as the ability to maintain the center of body mass within a stability limit. Standing balance involves a continuous stabilization process that requires the integration of visual, vestibular and somatosensory inputs from all over the body to assess the position and motion of the body in space. In particular, in the case of the elderly, balance is an essential part of all functions in daily living, because such subjects have impaired balance and an increased risk of falling<sup>1-3</sup>.

In order to improve balance abilities, many studies have adopted wide range of training methods involving balance training with visual feedback, muscle strength training, plyometric, virtual reality and mental training<sup>1,4-8</sup>.

The safe performance of balance and mobility related activity during daily life, such as standing while performing manual task, rising from a chair and walking requires adequate balance control mechanisms. One third to one half of the population over age 65 reports some difficulty with balance or ambulation. Because of the high incidences of balance and mobility disorders in older adults and the large negative impact for the individual, intervention is necessary that optimize the performance of balance and mobility related activities<sup>9</sup>.

In this study it is designed to provide the subject with visual feedback with the physical training and to compare its effect with Mental Training to improve balance ability in female geriatrics.

## METHODOLOGY

A sample of convenience of 60 healthy asymptomatic female Geriatric subjects who aged between 66-80 years<sup>10</sup> and had no history of neurological problem<sup>1</sup>, no history of balance problem<sup>1</sup>, MMSE score greater than 24<sup>11</sup>, can ambulate independently without assistive device<sup>12</sup>, able to understand verbal commands were included in the study. Subjects with Cardiovascular disease symptomatic during moderate exertion<sup>13</sup>, Hip or Knee joint replacement<sup>13</sup>, visual impairment which cannot be corrected by lenses, impairment which hamper following commands were excluded from the study.

### PROCEDURE

Sixty Subjects who met the inclusion criteria were recruited and an informed consent was taken from the subjects and detailed explanation of the procedure was given. The subjects were then randomly divided into two groups, i.e. Physical Training Group (PTG) and Mental Training Group (MTG) with 30 subjects in each group. PTG and MTG performed a dynamic balance task with physical and mental training, respectively, in a 30 min training session, 5 times a week for 3 weeks. The postural balance of all the subjects was assessed and evaluated in terms of Global Balance Score measured by balance trainer along with Berg Balance Score before and after the training in both the groups<sup>1</sup>.

### DATA ANALYSIS

Data was analyzed using SPSS software. Independent Sample 't' test was used to compare the Global Balance Score and Berg Balance Score between the groups. Paired 't' test was used to analyze the Global Balance Score and Berg Balance Score before and after the intervention within the groups.

VARIABLES	GROUPS		t-VALUE (between groups)	p-VALUE (between groups)
	PHYSICAL TRAINING GROUP	MENTAL TRAINING GROUP		
	MEAN DIFFERENCE	MEAN DIFFERENCE		
GLOBAL BALANCE SCORE	2.80	1.40	5.48	<0.000*
BERG BALANCE SCORE	0.35	0.30	0.87	<0.38 <sup>NS</sup>

(NS= NON SIGNIFICANT, \*=SIGNIFICANT)

Table 1:- Comparison Of Pre And Post-Intervention Mean Difference Of Global Balance Score And Berg Balance Score Between Physical Training Group And Mental Training Group.

VARIABLES	GROUPS				t- VALUE	P- VALUE
	PHYSICAL TRAINING GROUP		MENTAL TRAINING GROUP			
	MEAN	S.D.	MEAN	S.D.		
GLOBAL BALANCE SCORE	12.0	2.81	12.6	2.06	-1.58	0.12 <sup>NS</sup>
BERG BALANCE SCORE	52.0	0.72	52.8	0.83	0.80	0.42 <sup>NS</sup>

(NS= NON SIGNIFICANT)

Table 2:- Comparison of Pre-Intervention Mean Of Global Balance Score And Berg Balance Score Between Physical Training Group And Mental Training Group.

VARIABLES	GROUPS				t- VALUE	P-VALUE
	PHYSICAL TRAINING GROUP		MENTAL TRAINING GROUP			
	MEAN	S.D.	MEAN	S.D.		
GLOBAL BALANCE SCORE	9.62	2.83	12.16	2.23	-3.26	0.002 *
BERG BALANCE SCORE	53.45	0.51	53.10	0.71	1.77	0.08 <sup>NS</sup>

(NS= NON SIGNIFICANT, \*=SIGNIFICANT)

Table 3:- Comparison Of Post-Intervention Mean Of Global Balance Score And Berg Balance Score Between Physical Training Group And Mental Training Group.

## RESULTS

Demographic data were no significantly different among the group in terms of age, height and weight. At the baseline, there were no differences in the Global Balance score ( $p= 0.12$ ) and Berg Balance Score ( $p= 0.42$ ) in between the groups. At the post training test, the Global Balance Score significantly improved in Physical Training Group and Mental Training Group, compared to the pre-training test ( $p<0.000$ ). However, Berg Balance Score ( $p<0.37$ ) did not significantly improve in Physical Training Group and Mental Training Group, compared to the pre-training test.

## DISCUSSION

This study was designed to investigate the effect of balance training with physical training and mental imagery on female geriatric subjects. The mean pre and post intervention Global Balance Score of PTG was 12.0 and 9.62 and for that of MTG was 12.6 and 12.16 respectively ( $t$  value=5.4,  $p= .000$ ). Likewise, mean pre and post intervention Berg Balance Score of PTG was 52 and 53.45 and for that of MTG was 52.8 and 53.10 respectively ( $t$  value=.87,  $p= .38$ ).

The results of this study revealed that although three weeks of both the balance training methods have produced significant improvements post intervention but the Physical training group has performed better in terms of Global Balance Score than Mental training Group. But no such significant improvement was found in terms of Berg Balance Score in either of the groups.

This comparison of both training groups showed that actual physical balance training with visual feedback was more effective than mental balance training with motor imagery. Concerning the better outcome of physical balance training, it is postulated that the additional visual information might make subjects more aware of their body's displacement and orientation in space.

The results for MTG were in accordance with several prior studies, indicating that mental training produces improvement of muscular strength. At the cortical level, a specific pattern of activation, that closely resembles that of action execution, is observed in areas devoted to motor control. This activation might be the substrate for the effects of mental training<sup>14</sup>. Therefore the findings of this study support the

fact that postural balance training with motor imagery is an effective therapeutic method for improving the balance control ability of healthy subjects<sup>1</sup>.

## CONCLUSION

From the results it can be seen that although both the groups improved significantly after the balance training especially in terms of Global Balance Score but not according to the Berg Balance Score. Therefore it is concluded that the Physical training with visual feedback proved to be more effective than Mental Imagery and hence Alternate Hypothesis can be partially accepted.

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