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BENEFITS OF BALANCE TRAINING TO MAINTAIN EQUILIBRIUM AMONG OLD AGE PEOPLE

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ABSTRACT: **Introduction:** Balance is an integral component of daily (functional) activities. It is very sensitive, complex and multifactorial. It is the ability to maintain the projection of the body's centre of mass within manageable limits of the base of support, as in the standing or sitting or in transit to a new base of support, as in walking pattern (1). In old age ability to maintain balance is low and fall is frequent. **Objectives:** To determine the efficacy of balance training over old age individuals. **Inclusion Criteria:** Age > 65 years, no gender difference, independent ambulation and activity of daily living. **Exclusion Criteria:** Chest pain, cancer, amputation, cognitive impairments, neurological condition, fractures. **Methods and Procedure:** This study was conducted among 50 elderly people. It is randomized control trial, allocated into 2 groups as follow; experimental group and control group. Intervention was given to the subjects 3 times per weeks in 8 weeks. Subjects were assessed before and after. Control group activity included either usual activities or recreational activities. All participants underwent a screening process carried out by a physical therapist. They were given oral and written information about the study. **Results:** Based on independent "t" test there is significant differences between post-test between control and experimental group with p value of 0.00 (p<0.05). **Conclusion:** There was significant difference in the effectiveness of the balance training in improving the balance between control and experimental group.

INTRODUCTION: Balance is an integral component of daily (functional) activities. However, balance control is very sensitive, complex and multifactorial. Balance may be measured when the body has a constant, or static, base of support, or during movement from one base of support to another. It is the ability to maintain the projection of the body's centre of mass within manageable limits of the base of support, as in the standing or sitting or in transit to a new base of support, as in walking pattern ¹.

Alternatively, balance can be measured indirectly through by observation, or other reporting methods such as objective tests of functional activities. The ability of an individual to balance underlies the performance of most physical activities. The capacities to maintain various positions, to make automatic postural responses to voluntary changes in the body and it react to external disturbances are to functioning in daily life.

In the old age ability to maintain balance is often decreased may be contributing factor in the incidence of falls. Down in self- efficacy, high susceptibility to fall and reduced mobility can lead to serious problems facing many older age individuals. Balance impairment instability was the causes for fall during old age and counter to be treated by health care professionals.

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Balance is defined as the ability to maintain the projection of the body's centre of mass within limits of the base of support, as in sitting or standing or in transit to a new base of support, as in walking ². The ability to maintain balance is context dependent and different people can become unstable in different task and environmental conditions, depending on the particular body systems impaired ³. Given the importance of balance for function and the high impairment and mortality associated with fall that related injuries in older people ⁴. However, the ability to undertake functional activities is complex and multifaceted involving not only balance but other factors such as strength, proprioception, and integrity of the neuromuscular system, vision, pain and in some instances fear of falling. Declined balance is attributable to an age-related reduction in multiple physiological systems that contribute less muscle flexibility and strength, decreased central processing of sensory information, and slowed motor responses ⁵. Physiological changes related to the ageing include, for example, cognitive impairment ⁶, reduction in muscle strength ⁷, proprioception ⁸, joint range of motion ⁹, and changes in sensory systems ¹⁰. These factors potentially negatively affect control and impact on the functional ability of the older person.

Methodology: This experiment conducted at Bangalore population and the samples were collected as Purposive sampling method with random allocation of groups. The study design was pre-test and post-test experimental study design. Two different group was allocated whereas one experimental group and other was control group. We included randomized controlled trials and quasi-randomised trials (for the allocation of groups) testing exercise interventions designed to improve balance in older people against a control group. Control group activity included either usual activities or recreational activities. The participants was taken with eligibility criteria with elderly individual aged 65 years and above. The screening process done by a physical therapist. Informed consent carried out. The training session starts with the warm-up exercises and clinical assessment done

to evaluate balance. This training program had a maximum of 5 subjects per class, and was held 1 hour for 3 days in a week, for a total of 8 weeks. The Berg Balance Scale used to assess of different aspects of balance, including maintaining a fixed position, dynamic balance, and movement over a fixed base. Warm up exercises were performed in a seated position with the participant's chairs being set-up in "U" position around the instructor. All the standing exercises were performed on the smooth surface. We included trials with participants were described as older adults that age 65 years old and above, both gender female and male in a group, able to walk without assistive devices and can be independent to do all ADL (activity daily life) activities. One-leg stance with eyes open, tandem stance with eyes open, narrow walk test, limit of stability in standing. We excluded trials of interventions targeting individuals with specific conditions such as chest pain, heart attack in previous 6 months, individuals with undergoing active treatment for cancer, individuals with amputation of upper or lower limbs, individuals with cognitive impairments, dementia, and individuals with any fractures, Parkinson's disease and stroke.

The outcome was measured by Berg Balance Scale. It is commonly used clinical measure to evaluate performance during various balance activities. The BBS were developed as a performance oriented measure of balance in elderly individuals. The BBS consist of 14 items that are scored on a scale of 0 to 4. A score of 0 is given if the subject is unable to complete the task and a score of 4 is given if the participants are able to complete the task based on the criterion that has been assigned to it. The maximum total score on the test is 56. The items include simple mobility tasks (e.g. transfers, standing unsupported and sit-to-stand) and more difficult tasks (e.g. tandem standing, turning 360⁰, single leg stance).

RESULTS: The Statistical tool used was Paired "t" test (compare the value of pre-test and post-test within the group) and Unpaired "t" test – (compare the post-test value between two group).

TABLE 1: PAIRED SAMPLES STATISTICS OF EXPERIMENTAL GROUP

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Experimental pre, Experimental post	30.0000	25	7.83156	1.56631
		35.9600	25	6.62998	1.32600

Interpretation: From the **Table 1**, the pre-test mean value is 30.00 ± 7.83 and 35.96 ± 6.63 as the post-test value for experimental group.

TABLE 2: PAIRED "T" SAMPLES STATISTICS OF EXPERIMENTAL GROUP

	Mean	Std. Deviation	Paired Differences		t	df	Sig. (2-tailed)	
			Std. Error Mean	95% Confidence Interval of the Difference				
				Lower				Upper
Pair Experimental - 1pre Experimental post	-5.96000	3.46987	.69397	-7.39229	-4.52771	-8.588	24	.000

Interpretation: Based on the **Table 2**, there is a significant difference between pre- test and post-test value of the BBS in experimental group.

TABLE 3: PAIRED SAMPLES STATISTICS OF CONTROL GROUP

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Control pre-test, control post-test	21.7200	25	6.13406	1.22681
	22.8000	25	5.43906	1.08781

Interpretation: From the **Table 3**, the pre-test mean value is 21.72 ± 6.13 and 22.80 ± 5.43 as the post value for control group.

TABLE 4: PAIRED "T" SAMPLES STATISTICS OF CONTROL GROUP

	Mean	Std. Deviation	Paired Differences		t	df	Sig. (2-tailed)	
			Std. Error Mean	95% Confidence Interval of the Difference				
				Lower				Upper
Pair 1 Control pre -Control post	-1.08000	1.15181	.23036	-	-.60456	-	24	.000
				1.55544		4.688		

Interpretation: Based on the **Table 4**, there is a significant difference between pre- test and post-test value of the BBS in control group. Since there is p value is $.00 (p < .05)$ and pre-test mean with the value of 21.72, whereas post-test mean is 22.80, there is improvement in balance of the elderly people with normal physical activity.

TABLE 5: INDEPENDENT "T" TEST (POST CONTROL AND POST EXPERIMENTAL)

	Group	N	Mean	Std. Deviation	Std. Error Mean
Post-test Berg balance scale	experimental	25	35.9600	6.62998	1.32600
	control	25	22.8000	5.43906	1.08781

Interpretation: From the **Table 5**, the post-test mean value for experimental group is $35.96 (\pm 6.63)$ and $22.80 (\pm 5.44)$ as the post value for control group.

TABLE 6: INDEPENDENT SAMPLE TEST

	Levene's test for equality of variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Post- Equal test variances Berg assumed	.064	.801	7.673	48	.000	13.16000	1.71511	9.71154	16.60846
balance Equal scale variances not assumed			7.673	46.234	.000	13.16000	1.71511	9.70814	16.61186

Interpretation: Based on the **Table 6**, there is a significant difference between post-test values of the BBS in experimental and control group. Since there is p value is .00 ($p < .05$) and post-test mean of control group with the value of 22.80 whereas post-test mean of experimental is 35.96, there is improvement in experimental group in balance of the elderly people with balance exercise.

DISCUSSION: The primary aim of the study was to find out the effectiveness of the balance exercise in improving the balance among elderly community. There was significant difference between post-test of control group and experimental group. It has been suggesting that functional balance training is a type of exercise that combines muscle strengthening and balance activities with functional gait activities.

There is study done by Means and colleagues²⁵ that investigated the effect of a program designed to improve balance in community-residing elders with or without a history of falls. The program incorporated activities such as stretching, strengthening, coordination exercise, body mechanics, balance training, survival training manoeuvres, and walking for endurance. The participants attended 90 minutes exercise sessions three times per weeks in groups of six to eight.

The participants who attended this 6 weeks comprehensive exercise program showed a reduction in the time to complete an obstacle course and in the number of falls and fall-related injuries. In addition, some evidence suggested that walking as an intervention for those at high risk of falls, are done without concurrent training may result in a higher risk of falling²⁶. Walking as an exercise should not be included in the beginning of a fall prevention program, when the focus needs to be on strength and balance. Range from once to three times weekly, and duration range from 12 weeks to one year²⁷. Furthermore, exercise that challenge the center of mass like reaching while standing with the feet remain fixed, and exercise that practice a narrow base of support (e.g., tandem stance, single leg stance) have been included in effective interventions²⁸.

Limitation of Study: The sample size for this study was particularly small.

Research Recommendation: A comparison between males and females could be done. A larger sample size is required needed to address the most effective dose and intensity of exercise in elderly individuals at risk of falls.

CONCLUSION: Based on the results of this study, there were significant differences in the effectiveness of the balance exercise in improving the balance among elderly community which is supporting my alternate hypothesis.

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CONFLICTS OF INTEREST: NIL

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