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Effect of BAPS Board Versus Frenkel Exercise on Balance in Stroke Patient's - A Pilot Study

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Abstract: ***Stroke occurs when the blood supply of the brain is reduced. When this happens, the brain does not get enough oxygen that's why the brain cells start to die. Human balance refers to the ability of a person not to fall. Stroke patients are at high risk of falling because their balance control is impaired. Falls may cause several serious problems for stroke patients. So the main aim of the study was to compare the effect of BAPS board versus Frenkel's exercise on balance in stroke patients and the objective of the study was to evaluate the efficacy of Balance training by BAPS Board and Frenkel's exercise. The study design is a randomised comparative experimental study. In present study 10 subjects were recruited and divided into two groups, BAPS Board training was given to one group and Frenkel's exercise was given to another group for seven consecutive days and its pre and post intervention effect were noted with the help of Berg Balance Scale. Demographic data was taken from the subjects. Pre and post berg balance test observe significant improvement with the BAPS Board and frenkel's exercises both in balance of post stroke patient. As per study, it has been concluded that BAPS Board and Frenkel exercise both improve balance in post stroke patient.***

Keywords: Stroke, Balance, BAPS Board, Frenkel's exercises, Berg Balance scale.

I. INTRODUCTION

STROKE occurs when the blood supply of the brain is reduced. When this happens, the brain does not get enough oxygen that's why the brain cells start to die. Normally Strokes occur when the blood supply to the brain becomes interrupted or blocked, due to thrombus, emboli or hemorrhage. A stroke is a medical emergency that need immediate treatment when it occurs.

During a Stroke, the brain doesn't take enough nutrients or oxygen, causing brain cells death. Stroke needs early diagnosis and treatment as soon as possible to decrease or minimize brain damage treatment of stroke depends on the type of stroke, whether it is ischaemic or hemorragic. The best way to prevent stroke is through maintaining a healthy lifestyle and treating each and every conditions that could be a risk factor [1].Symptoms are confusion, trouble with speaking and understanding. Headache, possibly with altered consciousness or vomiting, numbness or inability to move face or its parts and also arms, legs, particularly on one side of body, vision problems in one or both eyes, trouble in walking, including dizziness and lack of balance and co- ordination. Stroke can lead to long term health problems. It depends on how quickly it is diagnosed[2].

Human balance refers to the ability of a person not to fall. Stroke patients are at high risk of falling because their balance control is impaired. Falls may cause several serious problems for stroke patients. Therefore effective therapeutic measure for improving balance function and preventing falls are important in the rehabilitation of stroke patients[3]. Balance is the ability of an individual to successfully maintain the position of their body or restore the center of mass over time[4]. In a good posture it can be achieved by the minimal work of involved muscles or with a minimal postural way. Balance is achieved by the complex integration and coordination of sensory-motor control system including the sensory input, integration of that sensory input and by motor output to the head, eye, trunk and limb muscles[5]. Balance is greatest when the body's center of mass (COM) or center of gravity (COG) is maintained over its base of support (BOS).

Center of Mass is a point that corresponds to the center of the total body mass and is the point at which the body is in perfect equilibrium. It is determined by finding the weighted average of COM of each body segment[6].

Center of Gravity refers to the vertical projection of the center of mass to the ground. In the anatomical position, the COG of most adult humans is located slightly anterior to the second sacral vertebra [7] or approximately 55% of a person's height [8].

Base of Support defined as the perimeter of the contact area between the body and its support surface; foot placement alters the BOS and changes a person's postural stability [9].

Frenkel's Exercises are a set of exercise developed by professor Heinrich Sebastian Frenkle[10]. They are a system of slow repetition exercises. They increase in difficulty over the time of the program[11]. The patient watches his arm, hand movements(for example) and corrects them as needed[12].

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II. METHOD

The current study is A comparative study conducted in physiotherapy department of tertiary health centre. Patient with clinical diagnosis of cerebro-vascular accident (stroke) with ability of maintaining standing position without aid for atleast 2 minute were included in this study. Exclusion criteria include cognitive impairement, vestibular disorder, paroxysmal vertigo, visual disturbance, cardiac problem and any orthopaedic disease involving lower limb.

All of the patient were informed about the purpose and procedure of the study and consent form was duly signed before the participation. Demographic data was taken from the subjects with their assessment of outcome measure prior to their intervention (1^{st} day) and post intervention (i.e. 7^{th} day) and were randomly allocated into two groups. Group A was treated by BAPS Board and Group B was treated by Frenkel's exercises. The outcome measure of this study is balance in post stroke patients.

III. PROCEDURE

Group A were treated by BAPS Board in which patient was to stand over the BAPS board and Group B were treated by Frenkel's exercises training over frenkel chart for seven consecutive days. Pre and post intervention data will be observed by Berg Balance Scale. Statistical analysis were done by using of SPSS version 21. For this purpose raw data was entered into microsoft excel sheet, tabulated and subjected to analysis. The pre and post test scores of Berg Balance scale was measured using t test variables of all outcomes were compared after 7^{th} day with initial day value.

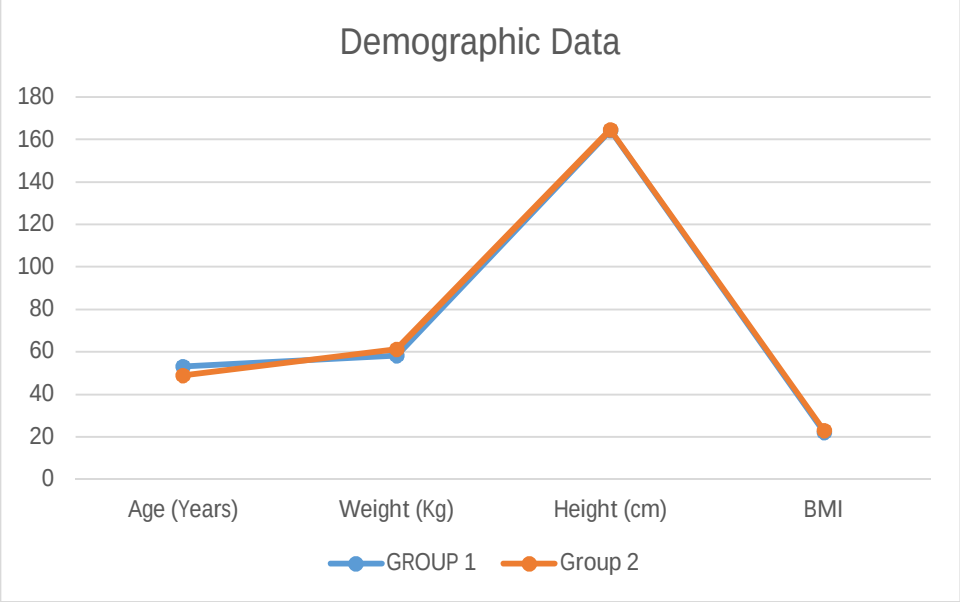
IV. RESULTS

The analysis of the data was analysed with the help of SPSS 21 through t test. While analysing the Group 1 data it has been found that BAPS Board was significant in improving the balance with Mean (+SD) of 1.800 (+ 0.837). After calculating the t value was 4.11 with p value of 0.009, which shows that the BAPS board was significant at the 99% confidence.

Table 1: Showing demographic data of Group 1:Group 2

	Group 1		Group 2	
	Mean	Std. Deviation	Mean	Std. Deviation
Age (Years)	53	3.493	49	10.440
Weight (Kg)	58.20	9.338	61.20	7.981
Height (cm)	164.20	10.941	164.60	7.987
BMI	22	3.0566	23	1.9604

Graph 1: It shows the variance between Age, Weight, Height and BMI between Group 1 and Group 2.



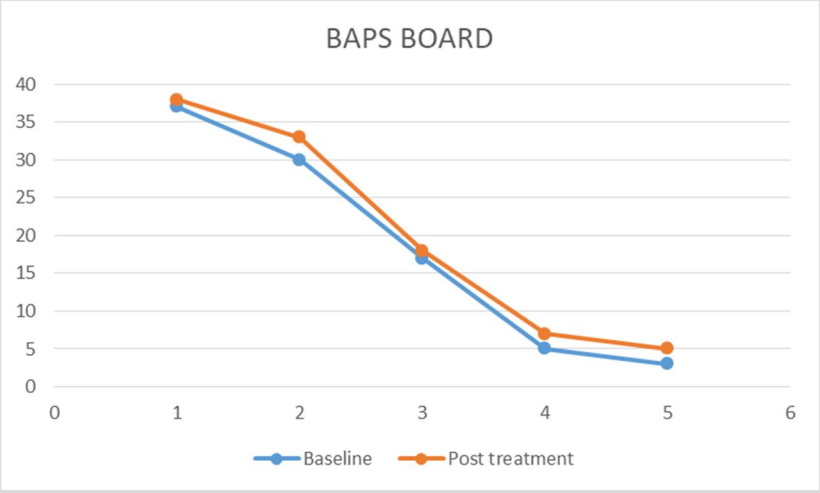
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Table 2: showing the data of Berg Balance Scale rating as pre and post treatment of Group 1 and Group 2.

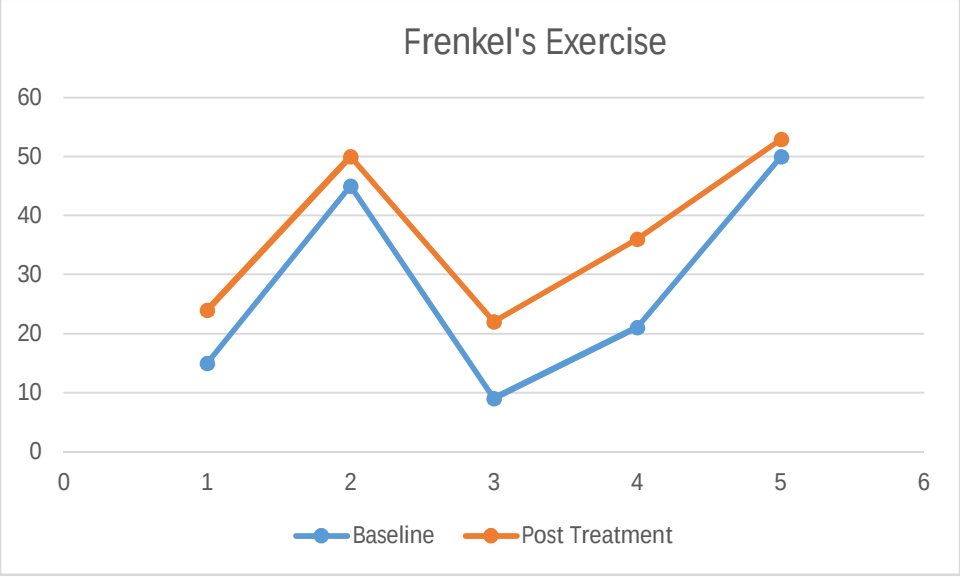
S. No	GROUP 1		GROUP 2	
	Pre	Post	Pre	Post
1.	37	38	15	24
2.	30	33	45	50
3.	17	18	9	22
4.	5	7	21	36
5.	3	5	50	53

This study reveals that the balance can be improved with the BAPS board and Frenkel's exercises both in patients with CVA. The significance of the difference in the mean between Pre-Post treatment for the group was checked using a paired sample t-test. For Group-1 the t-value was found to be 4.81 and was significant at the p-value of 0.01 (99% Confidence Interval). Hence the BAPS board was found to be significant in improving balance in patients with CVA. For Group-2 the t-value was found to be 3.94 and was also found to be significant at the p-value of 0.01.

Graph 2: Represents the data of pre and post treatment rating of Bergs Balance Scale rating of Group 1.



Graph 3: Represents the data of pre and post treatment rating of Bergs Balance Scale rating of Group 2.



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Table 3: Showing the pre (baseline) and post-treatment (after 7 days) scores for BAPS (Group- 1) and Frenkel's (Group-2).

	Mean	Std. Deviation	t-value	p value
Pre- Post (Group 1)	1.800	.837	4.811	.009
Pre- Post (Group 2)	9.000	5.099	3.947	.017

While analysing between the Group 1 and Group 2 an independent t test was used, it has been found that there was no significant difference between both the groups with the t-value of 1.18 with p value of 0.107.

Table 4: Showing comparison of the mean between the treatment groups

	t-value	p-value
Group1- Group2	-1.816	0.107

Thus, both the treatment groups BAPS and Frenkel's were found to be significantly effective in treating CVA with 99% confidence interval. Whereas there was no significant difference found between BAPS and Frenkel's exercises, hence the null hypothesis is accepted.

V. CONCLUSION

As per the result, it has been concluded that BAPS board and Frenkel's exercises both can be used to treat the impaired balance in CVA patients. While both the treatment protocols were effective but there was no significant improvement found in any single treatment over another. Hence it has been concluded that both the treatments can be used for the treatment of balance issue in CVA patients.

VI. DISCUSSION

Balance refers to the ability of a person not to fall. Stroke patients are at high risk of falling because their balance control is impaired. Falls may cause several serious problems for stroke patients. Therefore effective therapeutic measure for improving balance function and preventing falls are important in the rehabilitation of stroke patients[3]. Balance is achieved by the complex integration and coordination of sensory-motor control system including the sensory input, integration of that sensory input and by motor output to the head, eye, trunk and limb muscles[5].

In this present study there was two groups of stroke patient. BAPS board training was given to first group and Frenkel's exercise training was given to second group. Berg Balance Scale was used to evaluate the improvement in the balance of stroke patient from mild to moderate severity with training period of 7 days. After ending the training period and by evaluating the berg balance scale, study shows that there was a significant improvement in balance in stroke patient by employing both technique BAPS board training and Frenkel's exercise training.

Abhishek et al study shows visual feedback technique is an effective approach for post- stroke balance training as it results in better locomotor abilities. This mode of training is well tolerated by patients with stroke and is compatible with rehabilitation practices in clinical setting. This strategy could be used in combination with other rehabilitation strategies such as providing bodyweight support to assist balance in acute post-stroke phase. Identifying the optimal period after the lesion during which to initiate this type of training to maximize

function is yet to be investigated. This strategy provides a dynamic and integrative approach for the treatment of balance dysfunction following stroke.[13]

Cheng et al study showed fewer falls occurred after 6 months in the trained group. It may suggest that repetitive sit-to-stand training and postural symmetry training to enhance symmetrical body-weight distribution improves the subject's sit-to-stand performance, and consequently decreases the number of falls in stroke patients. Fall prevention is among the most important goals of stroke rehabilitation. Therefore, this training program qualifies as a fall-prevention strategy in a stroke rehabilitation program.[14]

Geiger RA et al study indicate that there was no benefit of Balance master training when administered in combination with other physical therapy interventions, compared with physical therapy alone, when provided 2 to 3 times per week over a 4-week period to

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outpatients with hemiplegia secondary to stroke. However, improvements were observed with respect to both the Berg Balance Scale and the Timed "Up & Go" Test for the subjects as a whole, suggesting that early as well as delayed physical therapy interventions can be effective in improving balance and mobility in patients with hemiplegia. Spontaneous recovery cannot be ruled out as the reason for the subjects' improvement, however, because an untreated control group was not included in this study. Further research is needed to identify specific interventions that enhance recovery of function after stroke.[15]

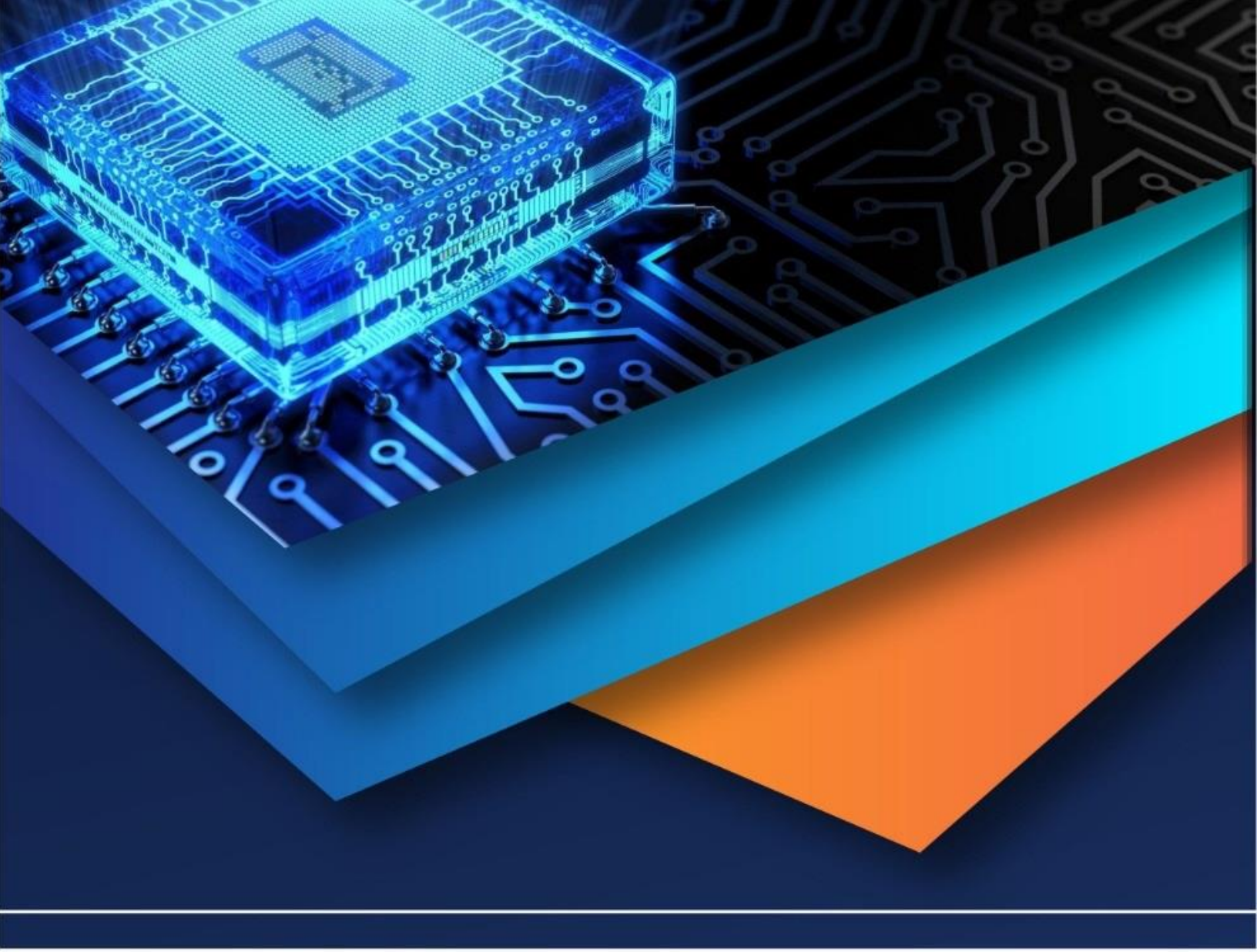
Above studies suggest that balance training given by physical therapy intervention, balance master training, visual feedback training, BAPS Board and frenkel exercises can affect the balance of stroke patient and improves it's quality of life, so these technique can give a better life to the patient.

This study was done on male patients only so future study can be done with taking female patient's too. Because this is pilot study so the sample size was small. In future study can be done with large sample size. The present study shows that both BAPS board and Frenkel exercises shows significant improvement in balance of post stroke patients. So this study is very helpful for the post stroke patients in improving their activity of daily living by improving their balance.

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