

# Effect of Tilt Table Training on Balance among Subjects with Basal Ganglia Bleed: A Pilot Study

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## Abstract

**Background:** Basal ganglia bleed is a major cause of disability with 40% subjects suffering from moderate to severe disability. Among different treatments, mobilization on a tilt-table and functional training, which consisted of strengthening and stretching exercises of the limbs, postural control training in sitting and standing positions, therapist-guided techniques for facilitating normal movement, and simple forward stepping might have effect on balance in subjects with Basal ganglia bleed.

**Objective:** To see the effect of tilt table mobilization and functional training on balance in subjects with basal ganglia bleed.

**Methodology:** 10 subjects within age group of 18-65 years diagnosed with Basal ganglia bleed were included in the study based on inclusion and exclusion criteria. After measuring the baseline data, subjects were given mobilization on tilt table and functional training 30 minutes per session 5 days a week for 6 weeks. Pre and post measures of balance were assessed using dynamic gait index (DGI).

**Results:** Mobilization on tilt table and functional training on balance in subjects with basal ganglia bleed showed statistically significant improvement in balance ( $p < 0.05$ ) on paired t test.

**Conclusion:** Tilt table training can be beneficial for improving balance in subjects with basal ganglia bleed.

**Keywords:** Basal ganglia bleed, Balance, Tilt table training, Functional training

## Introduction

Basal ganglia hematoma (BGH), one of the deadliest diseases, is generally caused by hypertension as well as rare abnormal vascular lesions, including arteriovenous malformations, moyamoya disease, and aneurysms. <sup>1,2</sup>

Basal ganglia bleed is a major cause of disability: 25% of basal ganglia bleed survivors live with minor disability, 40% with moderate to severe disability, and 10% require long-term care. Poor balance when walking is a common cause of disability after Basal ganglia bleed. <sup>3</sup>Gait and balance impairment owing to limb deficit after basal ganglia bleed is one of the

main determinants associated with poorer functional recovery. <sup>4</sup>Falls occur in up to 70% of persons with stroke (PwS) during the first 6 months after discharge from hospital or rehabilitation. <sup>5</sup>Falls are major causes of functional decline, poor quality of life, dependency, and mortality <sup>5,6</sup> Fear of falling in PwS can lead to reduced physical activity levels <sup>5</sup> and deconditioning, creating a vicious circle that may result in greater inactivity and social isolation. <sup>5,7</sup>

The right side basal ganglia bleed affects the left side of the body and left side basal ganglia bleed affects the right side of the body but both the right and left hemiplegia improved equally in the outcome

variables after rehabilitation. Thus, both the right and left hemiplegic patients should have effect from conventional physiotherapy or tilt table therapy in improving all the functional i.e. quality of life, muscle strength of upper and lower limb and neurological parameters.<sup>8</sup>

A tilt table consists of safety thoracic, pelvic and knee belts where belts are used to prevent forward tipping and to fix the patient's body while they are standing.<sup>9</sup> Rehabilitation on a tilt-table has been reported to be a useful way to mobilize severely impaired or non-cooperating patients, since it improves circulation, prevents contractures,<sup>10</sup> and increases pulmonary ventilation<sup>11</sup> and robotic tilt-tables<sup>12</sup> are effective in preventing blood pressure drops,<sup>13,14</sup>. One of study suggests that a reduction in motor impairments is greater after tilt-table exercises as it reduces long-term spasticity and improves strength<sup>14</sup>. In stroke a tilt table is generally used to prevent muscle atrophy and weakness at an early stage of rehabilitation of stroke patients under supervision of physical therapists. The tilt table also has benefits in adapting the patient's body to get it ready for weight bearing and walking.<sup>15</sup>

Previous studies showed that tilt table and progressive task oriented training on tilt table increased muscle activity<sup>[14]</sup> which improved lower extremities functions of acute stroke<sup>9</sup> Task oriented training includes a wide range of interventions such as walking training on the ground treadmill training matches reaching and one leg standing training for improving balance<sup>16</sup> Mobilization into a standing position, with a tilt table, has been shown to improve arousal and awareness in small groups of vegetative state (VS) and minimally conscious state (MCS) patients.<sup>17</sup> Another study showed that progressive task oriented training on the supplementary tilt table on lower extremity muscle strength and gait velocity, cadence, stride length and single limb support period and increased double limbs support period and gait symmetry in patients with hemiplegic stroke.<sup>18</sup>

However, the effect of tilt table training on balance among subjects with Basal Ganglia Bleed

has not been presented. Hence the present study aims to investigate the effects of Tilt Table Training on balance among subjects with Basal Ganglia Bleed.

## **Methodology**

The study was carried out in Nobel Medical College and Teaching Hospital, Biratnagar, Nepal. 10 subjects with basal ganglia bleed referred by neuro surgery ward for physiotherapy were taken for the study and demographic variables such as age and gender were documented. The inclusion criteria were individuals with age group of 18-65 years diagnosed as basal ganglia bleed with both open and closed head injuries, who were haemodynamically stable, mild GCS level. Subjects with fracture to pelvic bone and lower limbs, wound and deep vein thrombosis to lower extremities were excluded from the study.

## **Procedure**

Subjects were screened for their inclusion criteria and informed consent was obtained from their Caretakers. Their arousal level was assessed by GCS before any interventions. All patients received standard rehabilitation, which included mobilization on a tilt-table. Also all the subjects received functional training according to the daily routine schedule in the clinical setting, which consisted of strengthening and stretching exercises of the limbs, postural control training in sitting and standing positions, therapist-guided techniques for facilitating normal movement, and simple forward stepping (Fig 1). All treatment sessions were conducted in the neuro surgery ward to avoid unexpected study-related stimulation. The patient was placed in a lying position and other physical interventions were performed 30min before mobilization to tilt table. The patient was then moved to the tilt-table where baseline blood pressure, heart rate and breathing frequency were measured. This procedure was necessary to ensure the patient's comfort. Next, the patient was tilted head-up to 30° and the first measurements of blood pressure, heart rate and breathing frequency were performed. After 1 min., the patient was further tilted to 60°, measurements were repeated and followed by the last

tilt to 80° (Fig 2). Our clinical practice stipulates 80° as the maximum angle mobilization in most patients in order to maintain a comfortable position. If orthostatic hypotension, tachycardia, or tachypnea occurred, the

patient was instantly returned to the supine position. After 6 weeks of intervention subjects were again assessed with DGI to assess the improvement in arousal level.



**Fig1: Conventional Exercise Fig2:(Clockwise)Tilt table training at 0°, 30°, 60°, and 80°**

**Results**

Data was analysed with SPSS version 20.0. As pre and post data both were normally distributed t test was used for statistical analysis t test was used for statistical analysis. Table 1 shows the characteristics

of the participants and table 2 shows the results of t test scores of DGI between pre and posttest values after 6 weeks of intervention within the Group. It showed statistically significant improvement in balance with p value < 0.05

**Table 1: Characteristics of Participants**

Parameter	Values
Age(Mean ± SD)	58.2±15.7
Gender(Male/Female)	7/3
Side affected(Left/Right)	4/6

**Table 2: Pre and Post Comparison of DGI Values**

Sl.No.	Outcome measures	Pre test		Post test		Paired t-test	p-value
		Range	Mean $\pm$ SD	Range	Mean $\pm$ SD		
1	DGI	0-2	1.1 $\pm$ 0.73	3-4	3.6 $\pm$ 0.51	t=15	p<0.001*

\* denotes –Significant

### Discussion

The aim of this experiment was to improve balance and maintain strength in subjects with Basal ganglia bleed. Our study is in the agreement with the result seen in above mentioned studies showed statistically significant improvement within the group. Result of the present study demonstrate that the and mobilisation on a tilt-table and all of the subjects received functional training according to the daily routine schedule in the clinical setting, which consisted of strengthening and stretching exercises of the limbs, postural control training in sitting and standing positions, therapist-guided techniques for facilitating normal movement, and simple forward stepping have effect on the muscle and improved balance<sup>4</sup> on subject Basal ganglia bleed. Intervention rehabilitation is somehow simple easy and more effective because of its task oriented approach in terms of rehabilitation.

The study was conducted to investigate the clinical benefits of using supplementary progressive task-oriented training on the tilt table on the muscle activation changes in the LE,<sup>9,13</sup> functional abilities, and degree of performing activities of daily living in patients with Basal ganglia bleed. Rehabilitation with the help of this effective and standardized application of the tilt table strongly influenced LE motor recovery in patients.<sup>13, 19</sup>. This application protocol with the possibility of progressive inclination towards vertical alignment prepared the patients for a smooth transition to the upright position, gradually increasing the load

on the affected.<sup>4,8</sup>

The improvement could have been obtained as tilt-table rehabilitation offer standardized, intensive and repetitive exercises, a proper body weight support, with an appropriate sensory feedback amount and a controlled progressive verticalization.<sup>10</sup>It can also be correlated to ERIGO training as it is considered to be a valuable tool for the adaptation to the vertical position with a better global function improvement, as suggested by the sensory-motor and vestibular system plasticity induction in post-stroke patients.<sup>20</sup>

The tilt-table intervention followed by a home-exercise program proves to be much more beneficial in rehabilitation of stroke patients as it prevents the deterioration after hospital discharge and supports in sustaining the achieved improvement and help in further improvement of patients to gain most function and reduce dependency.<sup>10</sup>

In our study, the DGI values improved after mobilisation on the tilt-table and functional training when compared with other conventional physiotherapy which shows that tilt-table therapy could have improved balance with subjects This could be because of reduced extensor spasms reduced after tilt table standing.<sup>21</sup>

### Conclusion

The study concludes that mobilizations on tilt table along with functional training according to the daily routine schedule in the clinical setting has a

beneficial effect in improving balance among subjects with basal ganglia bleed.

**Ethical Clearance-** Taken from Institutional Ethical Committee of Nobel Medical College and Teaching Hospital

**Source of Funding-** Self.

**Conflict of Interest -** Nil

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