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Effect of Supervised Centre of Gravity Control Training to Reduce the Fear of Fall in Post-Stroke Patients

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ABSTRACT
Balance deficits furthermore fear of falling are two significant difficulties in post-stroke patients. The centre of gravity keeps changing according to our static and dynamic status, and all body movements cause a rapid change of the centre of gravity and the body itself to keep a state of equilibrium. The benefit ofCOG control training to reduce the fear of fall in post-stroke patients significantly benefit fromthe better patient recovery. Some studies found there is a relationship between balance, COG, and fear of falls.There is a lack of literature on similar studies among post-stroke patients.On the basis of inclusion criteria,a total of 14 post-stroke patients were recruited for the study. Dynamic stability is assessed by the time up-and-go test, and fear of falling is assessed by ABCscale.The current study among post-stroke patients was done by the T-test. The result indicated that there is a significant effect between balance, Cog,and fear of falls.The outcomes revealed that supervised COG control training was effective to reduce the TUG (sec) increase the ABC scores among post-stroke subjects. So, it may be concluded that the supervised COG control training is effective to treat the post-stroke subjects to reduce the fear of falls and increase their function.
Keywords:*CoG, Stroke patients, Fear of Falls.*

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INTRODUCTION

The world health organisation distinguished stroke as quickly created clinical indications of central or worldwide grumblings of brain function.Balance problemsfurthermore, and fear of falling are two significant difficulties in post-stroke patients [1].The primary concern of static stability is to keep COG inside the base of support limits. The greater part of the investigations on static stability keeps upthe rule [2].Body movement is the result of force from within the body as well as an external force acting upon a body [3]. The centre of gravity keeps changing according to our static and dynamic status, all the body movement causes a rapid change in the centre of gravity and the body itself to keep a state of equilibrium [3].

The World Health Organization (WHO) discovered fall is one of the outer reasons for unilateral injury. It is coded as E880-E888 in the International Classification of Disease-9(ICD-9) and as W00-W19 in ICD10. Equilibrium preparation is a significant piece of a fall avoidance program. It has appeared to improve the changed parts of posturalcontrol [4].

Fear of falling has been proposed as a free danger factor for diminished personal satisfaction, action limitation, loss of autonomy, and fallhazard". The connection among's certainty and fallhazard is settled. Trust in equilibrium can be estimated by the Activities Specific Balance Confidence poll (ABC), a self-announced survey in regards to trust in doing day-by-day exercises without loss of equilibrium. The ABC poll is an approved test that estimates certaintyin balance [5]. Different balance tests, (for example, coordinated time up and go test, tandem walk, one-sided position, and sit-to-stand test) can demonstrate if there is a high danger of falls and diminished actual freedom [6].

Fear of falling (FoF) is one of the most well-known post-stroke difficulties and is generally recognized as a component of an endless loop prompting genuine falls. It is a lessened post-fall condition coming from low equilibrium self-adequacy and the dreadful expectation of falling. The announced occurrence of FoF shifts between post-stroke stages, going from 54% before release from an intense unit to 44% a half year after stroke and 58%among network staying patients with stroke. On the off chance that no move is made, FoFtwisting into a deficiency of actual capacity, reliance on others for help with exercises of everyday living (ADL), limitations on day-by-day exercises, and a higher fall rate, ultimately trading off communityintegration [1].

Locomotion and equilibrium issues are significant prompt causes and high-hazard factors for falls and contribute altogether to the fear of falling [7].
Static equilibrium tests assess patients' ability to keep their COG inside the BOS in a consistent position. Dynamic tests are utilized to assess balance in light of deliberate development or outer bothers. In utilitarian equilibrium tests, patients need to keep their equilibrium while performing practical errands of various scopes of trouble as per the sort of action requested, for example, moving, sitting over the side of the bed, upheld sitting, sitting to standing, remaining in various positions, and strolling[4].
Need of study: Thedetailed pervasiveness of FoF changes between post-stroke stages, going from 54% before release from an intense unitto 44% at 6months after stroke and 58% among network-abiding patients with stroke. On the off chance that no move is made, FoF twisting's into a deficiency of physicalfunction [1] and as we know that balance is the ability to maintain COG over BOS. Also, key to effective exercise therapy is the clinical reasoning and individualized protocol [2] therefore identifying the benefit of COG control training to reduce the fear of fall in post-stroke patients significantly benefit a better patient recovery and the delivery of an improved service by health care providers.
Some studies found there is a relationship between balance, COG, and fear of fall. There are a lack ofstudies of similar studies among post-stroke patients. The goal of this study is to calculate the result of individualized COG control exercises to reduce the fall in post-stroke patients.

MATERIAL AND METHODS

Based on inclusion and exclusion criteria a total of 14 post-stroke patients were selected. Study setting and source of data: KrupanidhiCollege of Physiotherapy outpatient department, home care south Bangalore, in and around Bangalore. Study design: Pre-Post experimental study design. The summary of the research procedure, risks, benefits and consequences, and the effect was explained to the participants. On their approval, a signed informed consent would be attained.
The general condition of the patient was assessed before being subjected to the treatment.Inclusion Criteria: Age group: 50-65 years, Gender: both male and female, time post-stroke duration 6 months and,manifestingless balance self-efficiency grade below 80 on the ABC scale, MMSE >24.Exclusion Criteria: Rheumatoidarthritis, Lower limb spasticity,Hypertensive patient, osteoporosis.

Procedure

14 post-stroke patients were recruited for the study.
The individualized centre of gravity control training is given to the patient for 1 hour / 2 times a week for 6 weeks on 1:1basis [8] Every exercise phase session contains 10 min warm up, 40 minutes of COG control training, and a 10-minute cool-down period [10]. All the exercisesare to be done under the supervision of a physiotherapist and the therapist has to support the patient to maintain COG. Warm up include: Dance to your favourite song or jogging in place or any general free exercises which involve large muscle for 10 minutes. Both seated and standing warm-up exercises can be done according to the patient preference [10].
Exercise phase:
Step 1: Clinical reasoning assessment based on the Berg Balance Scale is done for identifying possible impairment e.g. Poor COG control, abnormal weight distribution, poor gaze stabilization, upper or lower body weakness, poor trunk stabilization, poor use of somatosensory inputs etc.
Step 2 exercise recommendations examples

- standing balance with altered BOS
- standing while performing upper body task
- Multidirectional weight shift
- Dynamic weight transfer
- Weight shift and transfer against gravity

Each COG control exercise is given for 8-10 repetitions with adequate rest in between
Step 3: Exercise progression was given once the patient performs with the prior level independently, timely, safely, and without any errors.
Cool down phase: seated diaphragmatic breathing exercises, self-stretching exercises of large muscles along with the performance discussion of the patient
Post-intervention measurement: at the end of 6 weeks of training via ABC scale and TUG

RESULT

A total number of 14 post-strokepatientsformedthe study population. Descriptive statistics were used to find out the frequency, percentage, mean and standard deviation from demographic data and variables studied.

Table 1: Distribution of post-stroke patients according to gender and age

S. no	Gender	Gender	Age	Unpaired t-test
		No. (%)	Mean ± SD	
1	**Male**	9(64.3%)	61.22±2.63	**t=0.252, p>0.05**
2	**Female**	5(35.7%)	60.20±4.43	

NS-Not significant. ie.,p>0.05.

The above table presents the background variables age and gender of the post-stroke subjects. Of thesample, 9(64.3%) of them were male and were female (5(35.7). The mean and SD of the age of the male post-stroke male subjects was 61.22±2.63 and the mean and SD of female post-stroke subjects was 60.20±4.43. The unpaired t-test result evidenced that there was no huge distinction between periods of post-stroke subjects over gender.

Table2: Range, mean and SD of TUG(sec) score of post-stroke subjects.

S. no	TUG(sec)	Range	Mean ±SD	P - value
1	**Pre-test**	26-48	36.21±8.13	P<0.001
2	**Post-test**	19-35	25.71±5.89	

Note; * denotes –Significant(p<0.05)

The table-2 Showing the outcomes of TUG(sec) of post-stroke subjects before and after the COG control training. In the pre-test, the mean and SD TUG(sec) was 36.21±8.13 but in the post-test, it was found to be reduced to 25.71±5.89. The paired t-test was utilized to test huge distinction and it was discovered to be statistically critical at p<0.001.

Table 3: Range, mean and SD of ABC score of post-stroke subjects.

S. no	ABC scores	Range	Mean ±SD	P- value
1	**Pre-test**	34-55	45.761±5.78	p<0.001
2	**Post-test**	49-70	61.92±6.0	

Note; * denotes –Significant,(p<0.05)

The table-3 shows the outcomes of ABC scores of post-stroke subjects before and after the COG control training. In the pretest, the mean and SD of ABC scores was 45.761±5.78 but in the posttest, it was found to increase to 61.92±6.02 the non-parametric test for paired outcomes when the scores are ordinalwas used to test significant difference andit was discovered to be statisticallysignificant at p<0.001.
The outcomes revealed that supervised COGcontrol training was effective to reducetheTUG(sec) increase the ABC scores among post-stroke subjects. So it may be concluded that thesupervised COG control training effective to treat the post-stroke subjects to reduce the fear of falls and increase their function.

DISCUSSION

Balance problems and fear of falling are the two significant difficulties in post-stroke patients [1]. Body movement is the result of force from within the body as well as an external force acting upon a body [3]. The Centre of gravity keeps changing according to our static and dynamic status, all body movement causes a rapid change of the Centre of gravity and the body itself to keep a state of equilibrium [3]This study was undertaken to determine the Effect of supervised Centre of Gravity Control Training to reduce the Fear of Fall in Post Stroke Patients
According to statistical analysis Distribution of post-stroke patients, the gender and age of the sample, 9(64.3%) of them were male and were female 5(35.7%). The mean and SD of the age of the male post-stroke male subjects was 61.22±2.63 and the mean and SD of female post-stroke subjects were 60.20±4.43. The unpaired t-test result evidenced thatthere was no huge distinction between times of post-stroke subjects over the sex.
Analysis of COG control training to avoid the fear of falls in post-stroke will be assessed by using the time up and go test and fall ABC score concluded that the outcomes revealed that supervised COG control

training was effective to reduce the TUG(sec) increase the ABC scores among post-stroke subjects. So it may be concluded that the supervised COG control training effective to treat the post-stroke subjects to reduce the fear of falls and increase their function

Time up and go test (sec) of post-stroke subjects before and after the COG control training. In the pre-test, the mean and SD TUG (sec) was 36.21±8.13 in the post-test it was found to be reduced to 25.71±5.89. Thepaired t-test was used to test significant differences and it was found to be statistically significantat $p<0.001$.

Range, mean and SD of ABC score of post-stroke subjects.Shows the outcomes of ABC scores of post-stroke subjects before andafter the COG control training. In the pre-test, the mean and SD of ABC scores was 45.761±5.78 but in the post-test, it was found to be increased to 61.92±6.02 the non-parametric test for paired outcomes when the scores are ordinal. It wasused to test significant differences and it was discovered to be factually significantat $p<0.001$.

A study done by Mackenzie Sullivan on Static and Dynamic Study on Balance, The study included static and dynamic balance testing and analysis of multiple participants as well as analysis of data obtained. And concluded that there are several tests and data reduction methods still to be determined. This project will be continued by the next class of students[2]

The present study concluded that the outcomes revealed that supervised COG control training was effective to reduce the TUG (sec) increase the ABC scores among post-stroke subjects. So it may be concluded that the supervised COG control training is effective to treat the post-stroke subjects to reduce the fear of falls and increase their function

LIMITATIONS

In this investigation the example size is small, the duration of the study is short, and prolonged follow-up was not possible due to dropouts of the sample, Study is mostly dependent on exercises, Patients were selected only based on clinical diagnosis, not on the radiological report.

RECOMMENDATION

Larger sample size with a prolongation of follow-up time is recommended to make the study more reliable. Further studies can be done including other physiotherapy treatment modalities and exercises.

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