Comparative The Impact Of Full Versus Segmental Modified Constraint Induced Movement Therapy On Lower Limb Function In Stroke Patients

A Randomized Clinical Trial

By

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Under the Guidance of

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2023-2025

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LIST OF ABBREVIATIONS USED

- WHO– World Health Organization
- CVA - Cerebrovascular Accident
- DALY- Disability-adjusted Life Years
- BBS- Berg Balance Scale
- DGI- Dynamic Gait Index
- GLUR2- Glutamate Receptor 2
- m-CIMT- Modified Constrained Induced Movement Therapy
- CIMT-Constrained Induced Movement Therapy
- LE-CIMT- Lower extremity Constrained Induced Movement Therapy
- MMSE- Mini-Mental State Examination
- LE- Lower extremity
- WGS- Winconsin Gait Scale

ABSTRACT

Background- cardiovascular disease, particularly ischemic CVA, remains a major global health burden and the second leading cause of mortality worldwide. The significant proportion of stroke survivors suffer from persistent gait and balance impairment due to disrupted neural control, muscle weakness and abnormal movement pattern. theses impairment severely limit mobility, daily function and independence. Modified constraint induced movement therapy has been shown promising result in upper limb function post CVA through the principle of motor learning and motor learning. However , its application to lower extremities remain under-explored. While full m-CIMT restrains the non paretic limb to encourage use of affected leg, segmental m-CIMT targets specific joints and muscle groups(e.g- hip, knee, ankle) .despite their potential , comparative documentation on their effectiveness in refining gait and balance is lacking.

Objective - To determine, the effect of full vs segmental modified constraint induced movement therapy technique on paretic lower extremity function (Gait & Balance) in stroke patients.

Method- 26 subjects with ischemic stroke diagnosed by MRI related with of aged between 40-65years were randomly assigned to Experimental group 1(n=13) and Experimental group 2 (n=13). Intervention was given for two groups performed the exercise for 120 minutes per session for 5 days a week for 2 weeks which includes:

Shaping strategy: 90minutes Transfer package: 30 minutes . Primary outcome measures include DGI and WGS and secondary outcome measure includes BBS . All the outcome measures were calculated before and after the 2 weeks.

Results –The results within the group showed significant difference ($p<0.05$) in both the experimental group . The between group analysis showed significantly greater improvements in DGI ($p = 0.00$) and BBS ($p=0.004$) scores in Group 2 compared to Group 1, with no significant difference in WGS scores ($p = 0.071$).

Conclusion- The study concluded that individuals with ischemic stroke showed more significant improvements in gait and balance when treated with full modified constraint-induced movement therapy (m-CIMT) compared to those who received segmental m-CIMT.

keywords - balance movement , ischemic stroke , global health , MRI , Function , Gait .

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INTRODUCTION

INTRODUCTION

Cerebrovascular disease is the major global health concern, and it is expected to increase notably. Currently , it is the second leading underlying factor of death worldwide. Nearly 1 in 6 people have a stroke in their lifetime. Annually, over 13.7 million new cases and 5.5 million death related to stroke comes about globally(1-2). The World Health Organization (WHO) defines a stroke as: "A stroke is a sudden onset of symptoms caused by a disruption in brain function, either in a specific area or affecting the whole brain. These symptoms last more than 24 hours or result in death, and the cause is related to problems in the blood vessels of the brain, with no other identifiable reason"(3). Ischemic Stroke contributes to 87% of all stroke cases, which making it the most common type of cerebrovascular incident (4). Nowadays ischemic stroke occupies the 4^{th} position among fatal disease. This ends in not only a significant economic but also an emotional burden on patients and their families (5). Aged blood vessels perform a pivotal role in the progression of ischemic stroke (6). Cellular senescence, a state of permanent cell cycle arrest caused by stress, leads to detrimental alteration in blood vessel function and structures. (7) As the senescent cells build up in vessels, they enhance the vascular aging, which intensify oxidative stress and inflammation. (6,8) This vascular deterioration characteristically leads to endothelial dysfunction and vascular re-modelling, which amplifies the risk and magnitude of ischemic stroke.(6,9) With vascular ageing cells cease division and develop a pro-inflammatory profile characterized by the manifestation of SASP and boosted the activity of senescence-associated beta galactosidase. IL-6 &

IL-1beta are pro-inflammatory SASP components that cause a leaky BBB, facilitating peripheral immune cell infiltration and enhancing the inflammatory response. In the geriatric population with ischemic stroke, SASP level increase greatly , promoting adhesion of molecular expression, recruitment of immune cells, release of cytokines and exacerbating chronic inflammation and damage of endothelial tissue which leads to endothelial dysfunction.(10, 11) The inflammatory response related to vascular aging firstly induces the formation and progression of atherosclerotic plaques, which assists in the cerebral artery obstruction and consequently leads to endothelial dysfunction. Secondly, inflammatory response gradually increases collagen deposition and abnormal angiogenesis (12,13). Thirdly, it triggers a cascade of oxidative stress, leading to endothelial damage and vascular remodeling. This creates a vicious cycle among these three events, which significantly contributes to the pathology of ischemic stroke.(14,15,16). Stroke often results in significant long term impairment mainly **GAIT** and **BALANCE .** More than 80 percent of stroke survivors suffers from walking dysfunction. (17) This results in challenges with daily activities of living and mobility. Stroke survivors often experience an prolonged swing phase and shortened stance phase on the affected side. This further leads to decreased walking speed and shorter stride length. (18) Stroke survivors experience walking difficulties due to disrupted neural control. As compared to healthy individuals, they exhibit reduced modular control during walking , typicality having only 2 to 3 functional modules in their affected leg. Normally, walking involves five modules these are

Module 1 - Gluteus, vasti and rectus femoris muscles support the body during early stance phase.

Module 2 - soleus and gastrocnemius muscles support and propel the body during late stance phase .

Module 3 - Rectus femoris and tibialis anterior muscles decelerate the leg during swing phase

Module 4 - Hamstring muscles decelerate the leg before heel strike occurs.

Module 5 - iliopsoas muscle activation accelerates the leg during early swing phase . (19)

In stroke survivors consolidation of these modules leads to reduced neural control, slower walking speeds , and asymmetric gait pattern. This adaptation may be a response to weakness and loss of control on the affected side, resulting in abnormal movement pattern. (20) (21) (22)

Gait control involves a complex network of neural structures, including the spinal cord , brain stem , cerebellum , basal ganglia , limbic system, and cerebral cortex , interacting with environmental factors . Motor modules are primarily regulated by the spinal cord and brainstem with the cerebellum providing oversight. Automatic processes manage body support, balance and rhythmic movement but require volitional; or emotional initiation. Voluntary movement involves the cerebral cortex, while emotional movement involves the limbic system . Basal ganglia influence all movement types through interactions with these system. Sensory feedback is essential for adapting movement and while walking primarily

results from automatic spinal and brainstem occurring without conscious though. Therefore any insult to these structures or connection pathway that results in the altered neural pathway.(22) (23) (24)

Gait impairments in stroke survivors vary widely categorized into four groups based on walking speed and muscle weakness

1. Fast walkers - weak plantar-flexor muscles lead to lack of heel rise and knee hyper-extension.

2. Moderate walkers - further weakened muscles(particularly hip and knee extensor), spasticity in gluteus maximus , quadricep and plantar flexors leads to excessive knee/hip flexion .

3. Slow- extended walkers - quadriceps weakness and knee hyper-extension. Compensatory mechanism include hip hiking and leg circumduction for foot clearance.

4. Slow flexed walkers - Severe weakness across hip , knee , ankle joints.

Excessive hip/knee flexion , ankle dorsiflexion , and trunk forward leaning and requires assistance for walking.(25)

ALTERD NEURAL CONTROL FOR POST STROKE GAIT-

The brain injury leads to gait impairments through both negative and positive upper motor neuron (UMN) signs. Damage to the motor cortex and corticospinal tract (CST) pathways results in negative UMN signs, most notably hemiparesis, which is characterized by muscle weakness on the affected side. At the same time, the loss of supraspinal inhibition causes

upregulation of the reticulospinal (RST) and vestibulospinal (VST) tracts, giving rise to positive UMN signs. These include spasticity, abnormal muscle synergies, spastic and synergistic coupling, and simplified motor modules that limit efficient body support and locomotion. The combined effect of weakness and abnormal muscle activation patterns ultimately produces mechanical consequences that manifest as gait impairments.(26)

Disuse of the lower extremity is prevalent among stroke survivors. When the non paretic limb is used, it potentiates afferent impulses to the sensory-motor cortex, which in turn inhibits the paretic limb. This inhibition leads to a loss of sensory-motor memory and the development of spastic asymmetric patterns. As a result , patients tends to rely solely on their unaffected limbs. Poor adaptive plasticity following stroke contributes of symmetrical use of paretic limb and positive feedback about improved coordination is essential. By promoting more balanced use and providing encouraging feedback , health care professionals can help stroke survivors regain motor function and improve overall mobility. (27)

Disturbed motor control and equilibrium lead to reduced weight-bearing on the affected limb, resulting in asymmetrical body movement.(28) Intra- and inter-limb coordination is compromised, with synergistic patterns dominating movement, which necessitates compensatory adjustments from the pelvis and nonparetic side.(29) This abnormal gait pattern triggers compensatory movements in the upper extremity, torso, pelvis, and unaffected side, further perpetuating abnormal movement patterns.(30,31) Consequently, hemiplegic patients require increased energy expenditure for mobility. Impaired static and

dynamic balance puts stroke patients at a high risk of falls, compromising their overall mobility and independence.(32)

Constraint induced movement therapy(CIMT) is a structured, evidenced-based neurorehabilitaion approach designed to improve upper limb function in individuals with stroke, cerebral palsy (33),(34). Modified Constraint induced movement therapy (m-CIMT) is a variation of the original Constraint induced movement therapy (CIMT), developed to enhance patient compliance and clinical feasibility by reducing the intensity, duration and constraint time associated with traditional CIMT protocols.The duration of interventions can range from 2 to 10 weeks, and the treatment time can vary from as short as 30 minutes to as long as three hours per day(38),(39).

The primary principle behind m-CIMT is the concept of " **learned non-use"** where the individuals progressively suppress the use of the affected limb due to repeated failure, reinforcing dependence on the unaffected limb. M-CIMT addressees this through two core components: **constraint of the unaffected limb** for a limited number of hour per day and **structured, repetitive , task-specifiic training** of the affected limb.(35),(36),(37)

The **core physiological mechanism** underlying its effectiveness remain centered on the principles of **neuroplasticity, motor learning and cortical reorganization .**

1. **Overcoming Learned Non-use & Cortical Reorganization:** The principles of CIMT & m-CIMT aims to reverse learned non-use which when countered with restraint of the unaffected limb and intensive practice , promotes cortical reorganization and functional recovery. (40),(41)

2. **Synaptic & Dendrtic Plasticity:** In ischemic stroke , CIMT enhances dendrtic and synaptic plasticity in sensorimotor cortex and increase GLUR2-containing glutamate receptors which is key mediators of synaptic strengthening which is contribute to improved the motor recovery.(42)

3. **Corticospinal Tract Remodeling:** CIMT induces remodeling of the ipsilesional corticospinal tract (CST) as revealed by increases in functional anisotrophy in diffusion tensor imaging (DTI), supporting structural recovery of motor pathways.(44)

4. **Bilateral Neuroplatic Engagement:** CIMT promotes neuron recruitment into the motor network from the contralesional hemisphere and increase synapse number and neuronal activation (c-Fos expression) , reflecting bilateral structural and functional reorganization not limited to the damaged side.(45)

5. **AMPA Receptor-Dependent Plasticity:** Enhanced AMPA receptor-mediated synaptic plasticity in the ipsilateral hemisphere has been documented following CIMT, providing insight into how cimt facilitates neural recovery at a molecular level.(43)

6. **Human Neuro-imaging Evidences:**functional and metabolic evidence in humans undergoing CIMT/m-CIMT shows increased activity in cortical motor areas-including the primary motor cortex area and supplementary motor area are undergoing neuroplastic changes underlying sensorimotor recovery.(45)

To improve gait and combat the general inactivity of the lower extremity modified constrain-induced movement therapy (m-CIMT) is a useful approach.

It consists of shaping strategy that uses graded massed task practice of the lower limb and the transfer package to integrate the learning into activities of daily living. This technique improves different kinetic and kinematic parameters of gait & balance.(43)

NEED OF STUDY-

stroke survivors often have persistent lower limb dysfunction, affecting mobility and independence. While **Modified Constraint-Induced Movement Therapy (m-CIMT)** has proven effective for upper limbs, its application to the lower limb remains underexplored. **Whole Lower Limb m-CIMT (WLL-m-CIMT)** restrains the unaffected leg to force use of the affected leg, while **Segmental m-CIMT** targets specific muscle groups or joints (e.g., ankle, knee). Both aim to promote neuroplasticity and recovery, but their relative effectiveness is unclear.

WLL-CIMT may increase **fatigue** and **adverse effects** (e.g., overuse injuries) due to the high physical demand. Segmental m-CIMT may be less taxing and more targeted, reducing fatigue and injury risk.

A **randomized clinical trial** is needed to compare the impact of WLL-M-CIMT and Segmental M-CIMT on **gait and balance**, while assessing **adverse effects**, and **patient adherence**. This study will help optimize rehabilitation strategies and improve outcomes for stroke survivors.

AIM & OBJECTIVE

AIM OF THE STUDY

To find out ,

The effect of full vs segmental modified Constraint induced modified therapy technique on paretic lower limb function (Gait & Balance) in stroke patient.

OBJECTIVE OF STUDY

To determine,

The effect of full vs segmental modified constraint induced movement therapy technique on paretic lower extremity function (Gait & Balance) in stroke patients.

HYPOTHESIS

HYPOTHESIS

NULL HYPOTHESES:- There will be no significant difference between full vs segmental modified constraint induced movement therapy on paretic lower extremity function in subject with stroke.

ALTERNATE HYPOTHESES:- There will be significant difference between full vs segmental modified constraint induced movement therapy on paretic lower extremity function in subject with stroke.

REVIEW OF LITERATURE

Review of literature

- **Prevalence of stroke-**

1. Sukanya Rangamani et al 2023 done a study on stroke incidence, mortality , sub types in rural and urban population in five geographic areas of india (2018-2019). The increasing stroke burden in India necessitates the development of a long-term surveillance framework. Earlier Indian studies were predominantly urban-based, short-term, and provided limited data on incidence and outcomes. To address this gap, the National Stroke Registry Programme established five population-based stroke registries (PBSRs) in diverse settings—Cuttack, Tirunelveli, and Cachar (urban and rural), and Kota and Varanasi (urban).

During 2018–2019, a total of 13,820 first-ever stroke cases (including 985 death-certificate-only cases) in adults aged ≥18 years were recorded. The pooled crude incidence rate was 138.1 per 100,000 population, with an age-standardized incidence rate (ASR) of 103.4 overall, 125.7 in males, and 80.8 in females. Rural residents had a higher stroke risk, ranging from one in seven in Cuttack to one in fifteen in Cachar. Ischemic stroke was the most common subtype across all registries.

The age-standardized case fatality rate (ASCFR) per 100,000 population was 30.0 in males and 18.8 in females, with male-to-female fatality rate ratios ranging from 1.2 (Cuttack) to 2.0 (Cachar). These findings reveal significant

sex and geographic disparities in stroke epidemiology and emphasize the need for region-specific prevention and management strategies in India. (46)

- **Risk factors of stroke -**

2. Martin J O'Donnel et al. in 2010, et. al conducted an international multicentre case control study that includes 3000cases among 22 countries on risk factor estimation for stroke. There were five risk factors responsible for more than 80% of the global risk of all stroke which includes hypertension, current smoking, abdominal obesity, diet, and

physical activity. (47)

3. Amy Guzik et al. in 2017, reviewed the advocated interventions for the modifiable risk factors of stroke. Regular exercise, dietary modification, along with management of the major risk factors, which include hypertension, diabetes mellitus, hyperlipidemia, and the use of tobacco can reduce the risk of developing CVA by 80%.(48)

- **Impairment of lower extremity functions in post-stroke patients-**

4. Varoqui D et al. in 2010,did a study on changes in the preferred postural pattern following stroke which included 36 patients. The spatial and temporal postural organization between post-stroke subjects and healthy individuals were compared. Subjects were asked to match their ankle-hip coordination in front of real-time biofeedback in the time of intervention. The study found the following changes occur in a hemiplegic patient's walking pattern, which are propulsion on the hemiplegic limb is reduced, reduction in the duration of the

stance phase on the hemiplegic side, reduction in the step length when the hemiplegic side is the in the stance phase, and reduction in walking speed.(49)

5. Birol Balaban et al. in 2014 did a systemic review on temporospatial, electromyographic, kinematic, and kinetic changes that occurred in post-stroke patients. The study concluded that the hemiparetic gait pattern after stroke is a combination of deviations and compensatory locomotion where every patient is having their unique temporospatial gait pattern that must be

evaluated and documented.(50)

- **Impairment of balance in post-stroke patients:**

6.Christian Federico Gath et al 2021 done a study on the impact of in-patient rehabilitation on balance in post-stroke patients. Berg Balance Scale was used to assess 149 stroke patients. The author found the Factors affecting the severity of the balance impairments are gender, handedness, site, and side of the lesion. Cognitive dysfunction is also an important factor in balance impairments and falls risk in post-stroke patients. (51)

- **Impact of Modified constrain-induced movement therapy (m-CIMT) and constraint-induced movement therapy (CIMT) on Neural Plasticity:**

7.Jian Hu et.al in 2020 conducted a study on Constraint-induced movement therapy (CIMT) improves functional recovery after ischemic stroke and its impacts on synaptic plasticity in the sensorimotor cortex and hippocampus. The consequences of the implication of CIMT in the brain of rats following a cerebral stroke were investigated by using ladder rung walking tests and golgi-

cox staining was performed to observe the synaptic plasticity at an interval of 7 days. The study concluded that, after stroke, damage to the dendrites and dendritic spines in the bilateral sensorimotor cortex and hippocampus was observed in rats. CIMT enhances the dendritic complexity in the ipsilateral sensorimotor cortex, enhances the density of dendritic spines in the contralateral sensorimotor cortex, and it amplify the expression of Glutamate receptor 2 (GluR2) in the ipsilateral sensorimotor cortex, which can be a mechanism of CIMT. to improve functional recovery after ischemic stroke.(43)

8.Auwal Abdullahi et al in 2020,reviewed impact of different biomarkers responsible for motor recovery following the application of modified constrain-induced movement therapy (m-CIMT) increases neuronal cell homeostasis which is accomplished through the improved brain glucose metabolism, perfusion of motor areas and Increased expression of different protein like Brain Derived Neurotropic Factor (BDNF), stromal cell Derived Factor-1(SDF-1), and Growth Associated Protein (GAP-43); increased number of ΔFosB-positive cells; and reduced levels of p-extra cellular signal Regulated Kinase (pERK), Gamma-amino-butyric acid (GABA)and among others. (52)

- **Impact of Modified constrain-induced movement therapy (m-CIMT) and constraint-induced movement therapy (CIMT) on mobility of post stroke patients:**

9.Ingela Marklundin et al in 2023 conducted a cohort study on lower-extremity constraint-induced movement therapy improved motor function, mobility, and walking after stroke with 147 sub-acute or chronic stroke

patients. All the patients received lower extremity Constrained Induced Movement Therapy (LE-CIMT) for6 hours per day for 2 weeks. Study concluded that high-intensity Lower extremity Constrained Induced Movement Therapy (LE-CIMT) was statistically significant to enhance the functional mobility, motor function, and walking ability in middle-aged sub-acute or chronic post-stroke patients. (53)

10.Saleh M. Aloraini et al in 2022, conducted a randomized Control trial on 38 stroke patients. were divided into two groups.19 patients received CIMT for lower extremity whereas rest of the 19 patients only received a conventional post-stroke rehab program All the patients received 3.5 hours of therapeutic sessions for 5days per week for 2 weeks. Ultimately the study results showed that there was significant clinical improvement in motor recovery of lower extremity, postural balance, and gait

speed in CIMT group. These improvements were retained 3 months following the interventions. (54)

11. Auwal Abdullahi et al. in 2021 conducted a Randomized Controlled Trial with 58 stroke patients. One group performed the modified Constraint-induced movement therapy (mCIMT) for 600 repetitions per day(n=30) and other group performed the Constraintinduced movement therapy (CIMT) for 3 hours a day, 5 times a week for 4 weeks. Fugl-meyer lower extremity (FMA-LE) assessment berg balance scale and rivermead mobility index were the primary outcome measure and secondary outcome measures includes modified Ashworth scale and 6-minute walk test. The study concluded that19 patients who performed 600 repetitions per session showed improved knee extensor

spasticity and exertions. But all the 58 patients showed improvement in functional mobility, walking speed, balance etc. (55)

12. Sevim et al. in 2019, conducted a study on the effectiveness of modified constraintinduced movement therapy for lower extremity strength and quality of life (QOL) in patients with stroke. 30 stroke patients were randomly divided into 2 groups. All the participants received Neuro-developmental therapy for four weeks. After four weeks experimental group received m-CIMT and the control group continues to receive NDT for two more weeks. The study result showed that the experimental group exert better result on paretic limb strength and quality of life (QOL).(56)

13.Emília Márcia Gomes de Souza e Silva et al. in 2017, conducted a single-blinded RCT on 38 subacute stroke patients to find out the effectiveness of Constraint-induced movement therapy (CIMT) on functional mobility and postural balance. 19 patients received treadmill training with a load of 5% of the body weight around the non-paretic ankle and the rest of the 19 patients received treadmill training without and additional load in the non-paretic ankle, for two weeks. Mid and post interventions outcome variables were balance and functional mobility. The study concluded that both groups showed significant improvement in their balance and functional mobility in sub-acute stroke patients. No significant difference was found between the group.(57)

14. Yulian Zhu et.al conducted in 2016, a pilot study with 22 hemiplegic patients to find out the effectiveness of modified-Constraint induced movement therapy(m-CIMT) on hemiplegic patient's gait. Patients were randomly divided into two modified -Constraint induced movement

therapy(m-CIMT) group and conventional therapy group, where participants in m-CIMT group received m-CIMT gait training session for 2 hours per day for 5 days a week and the conventional gait training group received standardized comprehensive gait rehabilitation for 45 minutes each day for 5 days a week. After 4 weeks of intervention study result shows that m-CIMT group showed that m-CIMT group had significant improvement in displacement of Centre of Mass (COM) in sagittal and frontal plane, as well as gait parameters velocity step length and step width.(58)

- **Reliability and validity of Mini-Mental Status Examination (MMSE):**

116 elderly stroke patients were evaluated 2-8 weeks and 6 months after the stroke to assess the efficacy of the Mini-Mental State Examination (MMSE). For confirmation, a neuropsychological test set comprised of five components assessing memory, math, and spatial ability was used. Motor activity, melancholy, aphasia, and everyday life tasks were all evaluated. Confusion in the acute period, the Barthel Index, depression scores, muscular activity level, and the majority of cognitive tests associated with the MMSE. Logistic regression revealed four independent factors that could predict MMSE results. A factor analysis revealed three variables that could account for 53% of the variation. When patients with solitary spatial dysfunction were removed, the accuracy for identifying dementia rose to 68%. When patients with solitary spatial dysfunction were removed, the accuracy for identifying dementia rose to 68%. In this elderly patient group, the MMSE had adequate validity in identifying cognitive dysfunction early after stroke. MMSE is used as a screening tool for post stroke cognitive impairment and dementia. The internal consistency was adequate (alpha = 0.78) (59)

- **Reliability and validity of Berg Balance Scale:**

Stephen Downs in 2013 did a systematic review of the Berg Balance Scale The analysis included 11 studies totaling 668 participants. The Berg Balance Scale's relative interrater reliability was good, with a pooled estimate of 0.98 (95% CI 0.97 to 0.99). The pooled value for relative inter-rater reliability was 0.97 (95% CI 0.96 to 0.98), which is a high level. For some individuals, the Berg Balance Scale had a ceiling impact. The average score 21 across all pertinent trials was in the range of in the analysis of absolute reliability. A Berg Balance Scale score of 20 or higher. The minimal detectable shift with 95% confidence was used to determine the absolute reliability across this portion of the scale, which ranged from 2.8 to 6.6 points. Higher absolute dependability is achieved with the Berg Balance Scale. (60)

- **Reliability and validity of Dynamic Gait Index (DGI):**

Johanna Jonsdotti did a study in the reliability validity of DGI in chronic stroke patients 25 consecutive participants who could walk at least 10 meters with or without assistance from a walking aid participated in the research. Performances on the DGI were graded by two impartial rater.

Two tests for the DGI were given in periods spaced three days apart. Two rater evaluated the attendees in the second session. Total scores and item scores were examined using intraclass correlation coefficients (ICCs), models 2,1, and the Bland and Altman technique. By comparing findings to the Berg Balance Scale, the Timed Up & Go test, the Timed Walking test, and the

Activities-Specific Balance Confidence Scale, concurrent construct validity was examined. Reliability for single-item scores ranged from moderate to excellent, while test-retest and interrater reliability of total scores had good (.96,.96, respectively) ICCs. All metrics supported the concurrent construct validity hypotheses. The DGI demonstrated strong dependability and proof of concurrent validity with other measures of balance. The ICC grade is 0.92, which is very good. (61)

- **Reliability and validity of Wisconsin Gait Scale :**

Estrada-Barranco et al. (2019), in a study of 61 stroke patients, demonstrated that the Wisconsin Gait Scale (WGS) has moderate construct validity in acute stroke ($r = –0.592$ to $–0.773$) and excellent validity in subacute and chronic stages ($r \geq 0.8$) when correlated with walking, balance, and functional measures. Similarly, Yaliman et al. (2014), in 19 hemiplegic stroke patients, confirmed the WGS as a highly reliable tool, reporting excellent internal consistency (Cronbach's $\alpha = 0.91–0.94$), very high interrater reliability (ICC = 0.91–0.96), and good intrarater reliability (ICC = 0.75–0.90), supporting its use for objective gait assessment in rehabilitation. (62),(63)

METHODOLOGY & PROCEDURE

METHODOLOGY

- Study Design: Randomized clinical trial
- Study Population: Stroke patients with Brunnstorm stages of Recovery ≥ III
- Sample Size: 28, Group A- 14, Group B- 14
- Sample Design: purposive sampling
- The sample size was calculated by using G POWER
- Study Setting : Arogya Nilaya Physiotherapy Centre , sikhar pur , cuttack.
- Study Duration: 6 months

SELECTION CRITERIA

Inclusion Criteria

• Both genders aged between 40 to 65 years

• Subject with mild to moderate disability according to Brunnstrom

Recoverystages between ≥ III

• Good cognitive ability (Mini-Mental status examinationscore≥24)

• Subject able to stand and walk with minimal assistance

• Subjects with cerebral stroke

Exclusion Criteria

- History of Unstable cardiac conditions
- Subject with any perceptual deficit.
- Subject with walking aid
- Other adverse medical conditions affecting balance, gait, pain, or any kind of discomfort that can interfere with the completion of the training
- Subjects having tightness contracture and deformity .

SAMPLE SIZE CALCULATION

Sample size was calculated in G-power software using mean(10.80,5.67) and standard deviation(4.54,3.39) , effect size(1.28), alpha (0.05), power(0.95)

Material used:

- Chair
- Pulse oximeter
- Sphygmomanometer
- Pen
- Marker
- Cone

• Rehabilitation staircase

• Balance board

• Weight cuff

• Full leg orthosis

• Measuring tape

OUTCOME MEASURES

Primary outcome measure

• Dynamic Gait Index

• Wisconsin gait scale

Secondary outcome measure

• Berg Balance Scale

Study Variables:

• Balance

• Gait

Screening tools:

• Brunnstorm recovery stages

• Mini-Mental State Examination (MMSE)

VARIABLES

Dependent variable

• Dynamic Gait Index

• Wisconsin gait scale

• Berg Balance Scale

Independent variable

• Age

• Gender

• Modified CIMT

Procedure

The study was carried out over a period of 2 weeks at Arogya Nilay Physiotherapy Centre

1. **Recruitment and screening**- Participants were recruited through referrals and contacts from other practitioners.Information regarding the study was provided directly by the therapists of the clinic as well as the principal investigator. Interested individuals were screened based on inclusion and exclusion criteria.Eligible participants were explained the purpose, processes ,risks and benefits of the study and informed written consent was obtained
2. **Group Allocation**- Following recruitment, participants were randomly allocated into two groups using a computer generated randomization

sequence and allocation concealment was ensured by using sealed opaque envelopes after the baseline assessment was done. A total of 26 participants were divided into two groups

- Group A(Experimental group 1- 13 participants)- Received full m-CIMT
- Group B(Experimental Group 2- 13 participants)- Received Segmental m-CIMT

3. **Baseline assessment** – Before beginning the intervention the participants underwent baseline assessment .The assessments were performed by a physiotherapist. The outcome measures used were Dynamic Gait Index & Wisconsin gait scale (Primary outcome measure) and Berg Balance Scale (Secondary outcome measure).

   Participants were assessed in the same environment under similar conditions to ensure accuracy and standardization.

4. Intervention Protocol

Group 1 -Experimental group 1 (Full m-CIMT)- Subjects put on combined an ankle weight cuff , whole leg orthosis around their non-paretic limb and keep the hip and knee in extension of non paretic lower extremity for immobilization. Exercisess are

- Sit to stand transfer by using appropriate chair.

• Indoor overground walking training(forward, backward , sidewards)

• Weight bearing activities to different direction

• Climbing up and down stairs and ramp.

• Balance activities on the paretic lower limb

• Knee controlling on a step

• Stepping over obstacles.

Each of functional activities performed intensively over **20 minutes**, repetitively . After each 20minute activity period , a rest period of 5 minutes was be given to the patient. Throughout the session three joints constraint-ed equally.

Frequency- 5 sessions per week

Duration- Each session lasted for 120 mins

Total Duration- 2 weeks

Group 2 - Experimental group 2 (Segmental m-CIMT) - Subjects put on an ankle mass around their non-paretic limb for immobilization during the supervised period. Whole-leg orthosis used to immobilize the non-paretic limb during the supervised period. Subjects kept their non-paretic hip and knee in full extension with their foot flat without any restraining device. The restraint first done for the hip joint followed by knee joint followed by ankle joint . so each joint constrainted for two times throughout the session.

Exercises are-

- Sit to stand transfer by using appropriate chair.

• Indoor overground walking training(forward, backward , sidewards)

• Weight bearing activities to different direction

• Climbing up and down stairs and ramp.

• Balance activities on the paretic lower limb

• Knee controlling on a step

• Stepping over obstacles.

• Working with a bicycle ergonomics.

Each of functional activities performed intensively over **20 minutes**, repetitively . After each 20minute activity period , a rest period of 5 minutes was given to the patients.

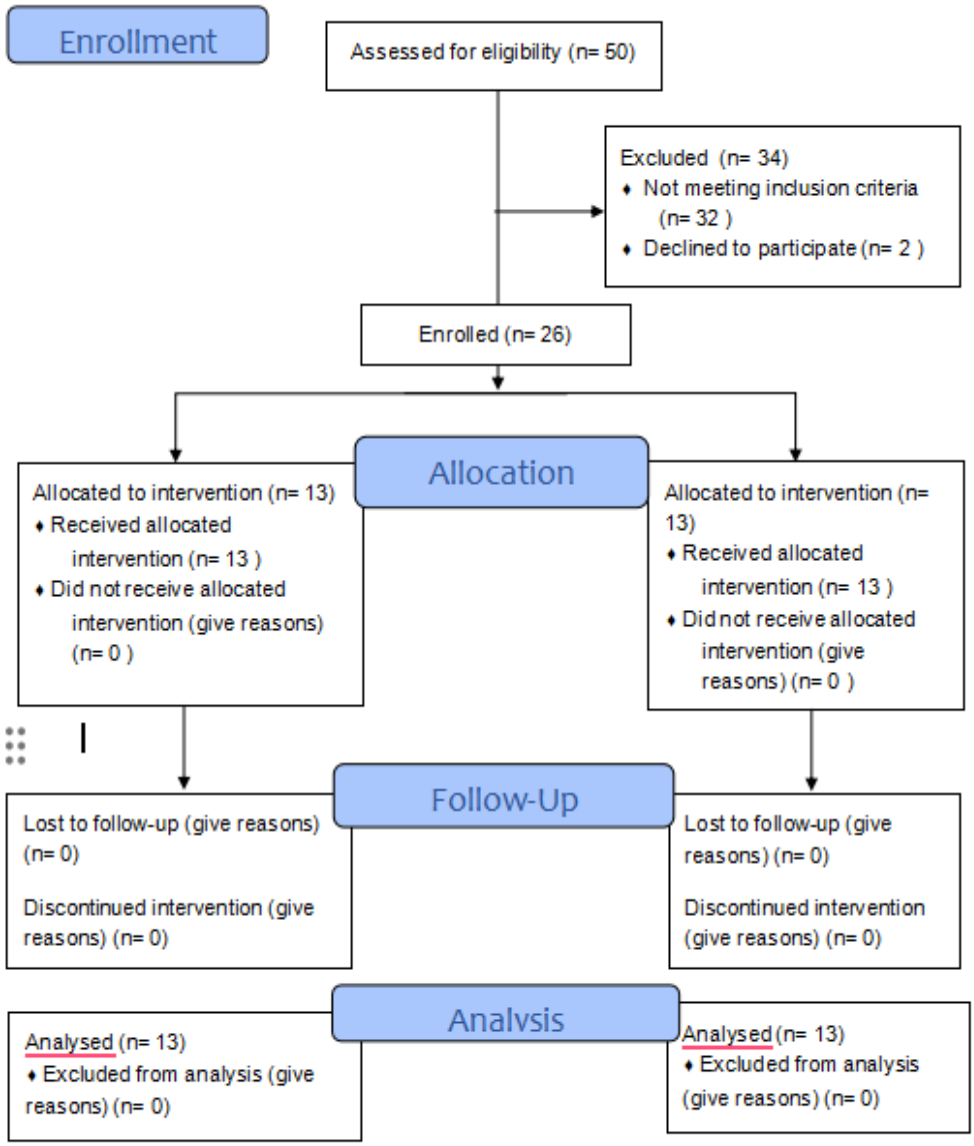
Frequency- 5 sessions per week

Duration – 120 mins

Total duration- 2 weeks

5. **Post Intervention Assessment**- At the end of 2 weeks outcome measures were reassessed using the outcome measures of DGI , WGS & BBS. Follow up was conducted in the same environment in order to ensure similar conditions were maintained with reliable comparison.
6. **Safety and monitoring**- Participants were monitored for any pain,swelling , fatigue or any other symptom which made them uncomfortable. The pain scores were constantly monitored .No adverse events were reported during the study.
7. **Data recording and storage**- All data were recorded in assessment forms and the scores from the outcome measures pre and post intervention was recorded in excel sheets.

CONSORT FLOW DIAGRAM



Experimental Group 1 (Full m-CIMT)

Fig-1 SIT TO STAND EXERCISE

Fig 2. WALK ON RAMP

Fig 3. STAND TO SIT EXERCISE

Fig 4. GAIT TRAINING EXERCISE

Fig 5. WEIGHT BEARING ACTIVITY

Fig 6. BALANCE EXERCISE ON BALANCE BOARD

Fig 7. STAIR CLIMBING UP EXERCISE

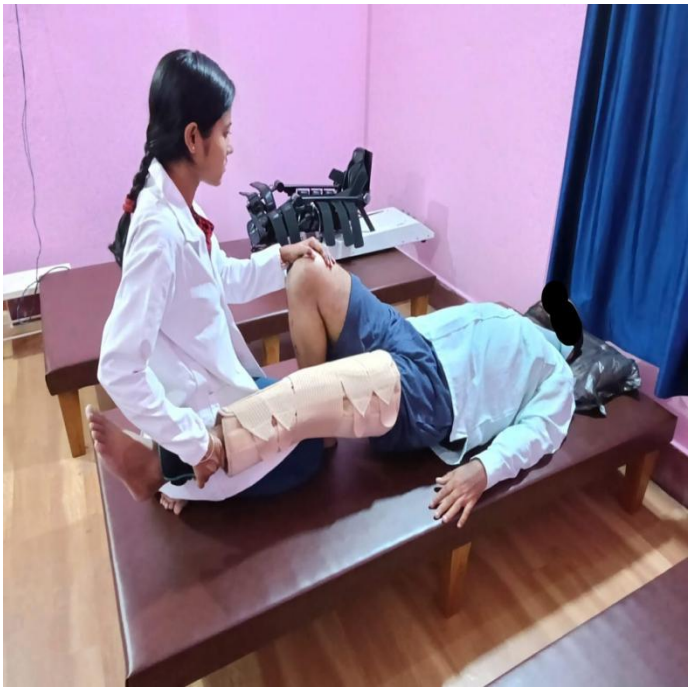


Fig 8. UNILATERAL PELVIC BRIDGE EXERCISE

Fig 9 . STAIR CLIMBING DOWN EXERCISE

Fig 10. OBSTACLES CROSSING EXERCISE

EXPERIMENTAL GROUP-2 (SEGEMNTAL m-CIMT)

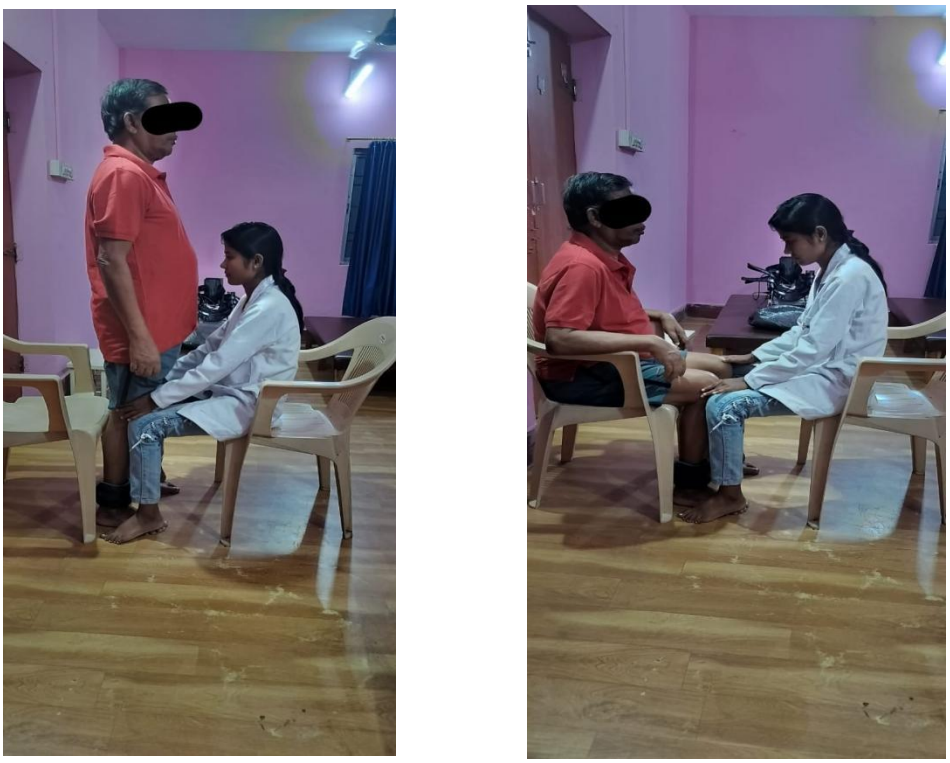


Fig 11. SIT TO STAND EXERCISE

Fig 12. UNILATERAL PELVIC BRIDGING EXERCISE

Fig 13. STAIR CLIMBING UP & DOWN EXERCISE

Fig 14. GAIT TRAINING EXERCISE

Fig 15. WEIGHT BEARING EXERCISE

Fig 16. Bicycle ergonomic exercise

STATISTICAL ANALYSIS

Statistical Analysis

Data was analysed using the statistical package **SPSS 22.0**, and the level of significance was set at **p<0.05 Descriptive statistics** was performed to assess the mean and standard deviation of specific groups. The normality of the data was assessed using **Shapiro Wilk Test. Interferential statistics** to find out the within-group difference was done using **paired t-test**and between the group, analysis was done using an **independent t-test.**

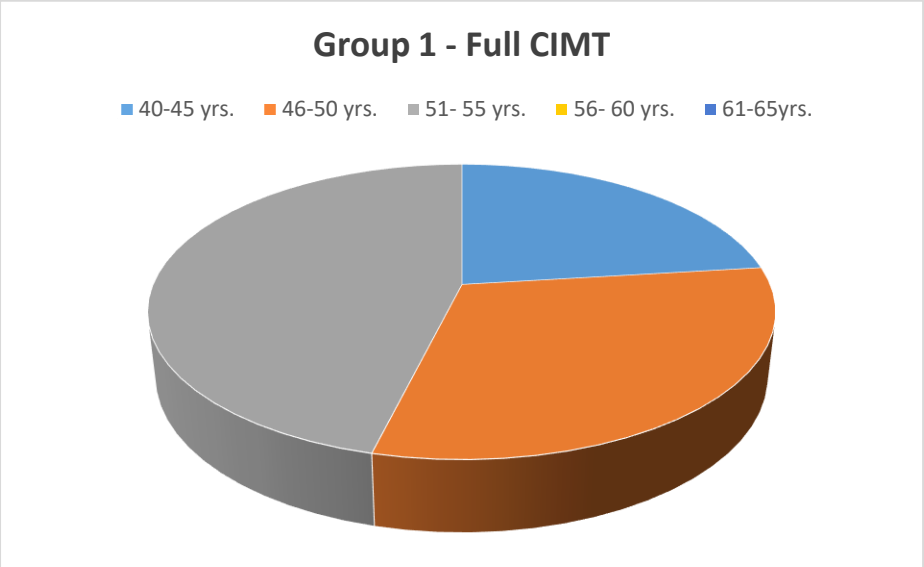
RESULT

In the present study 26 subjects with stroke were recruited. All the participants completed the study protocol and data were analyzed for 26 participants with stroke.

Table 1: Demographic details of Group 1 and Group 2

Variables	Group 1 (n=13)	Group 2(n=13)		
	Mean ± SD	Mean ± SD	P value Group 1	P value Group 2
Age (in years)	49 ±3.35	51 ±5.0	0.180	0.647
MMSE	26±1.05	26±1.1	0.178	0.084
BMI	22±1.4	23±1.6	0.532	0.347
ONSET (Duration)	8±1.6	9±1.5	0.228	0.170

Graph 1 - Pie charts of age group of Group 1 & Group 2



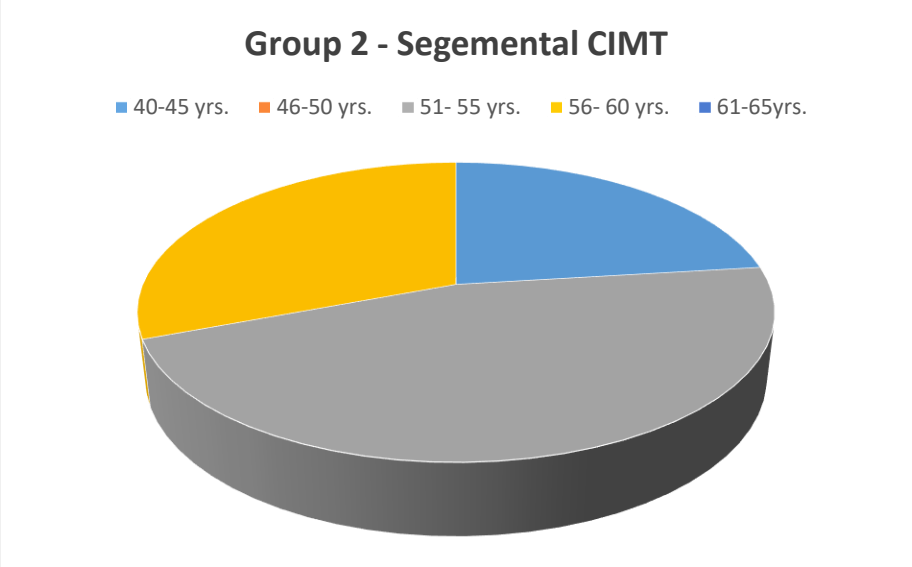
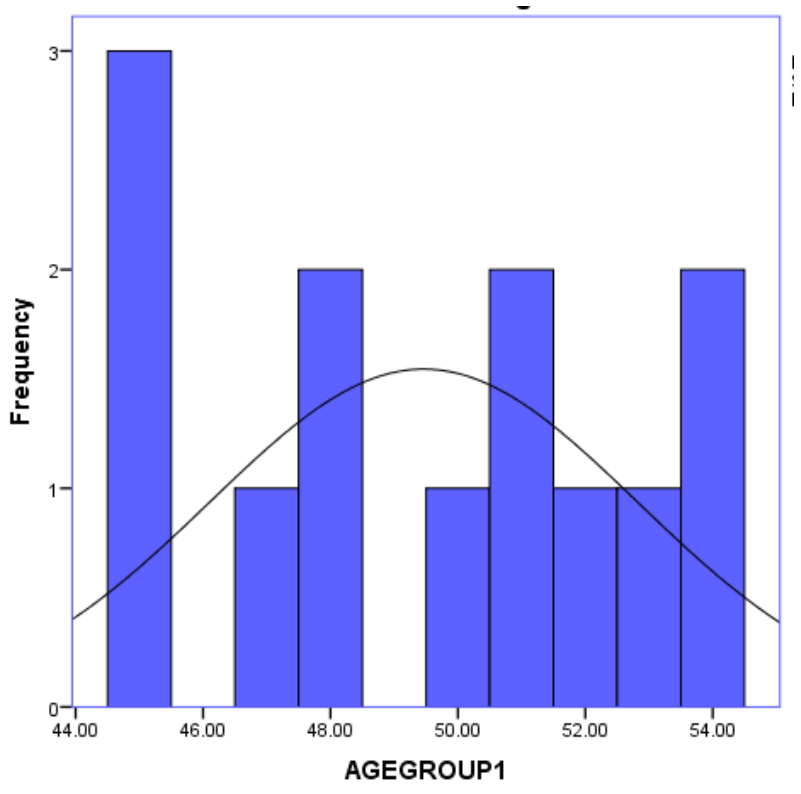


Table 2 - There were 13 patients in group 1 & group 2 with mean age and SD of age group

	Group 1	Group 2
No. of participants	13	13
Mean	49.46	51.92
SD	3.35	5.02

Graph 2 - Normality graph of age group of Group 1 & Group 2.



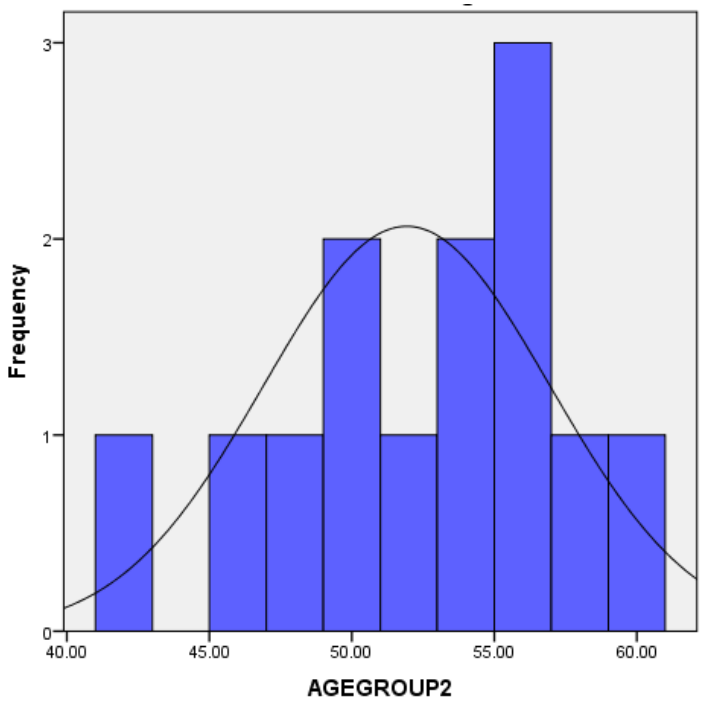
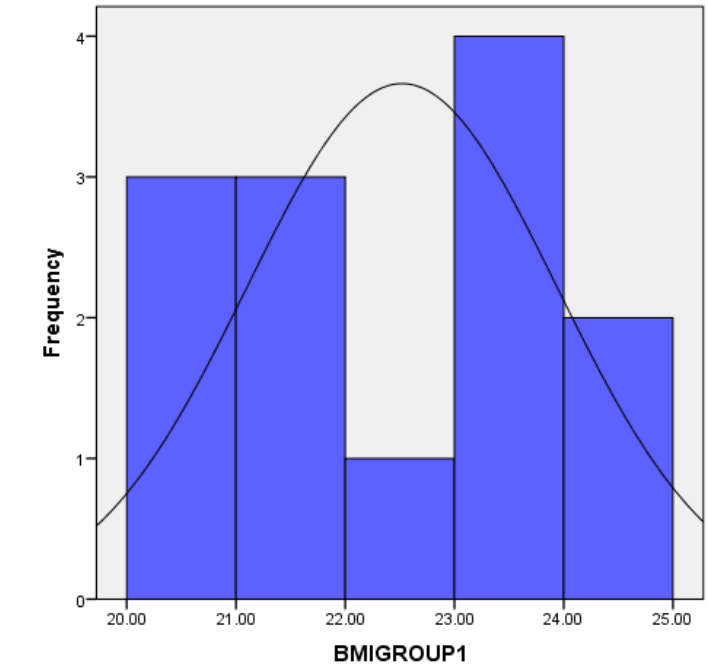


Table 3 - There were 13 patients in group A & group B with mean age and SD of BMI

	Group 1	Group 2
No. of participants	13	13
Mean	22.52	23.68
SD	1.41	1.61

Graph 3 - Normality graph of BMI of Group 1 & Group 2.



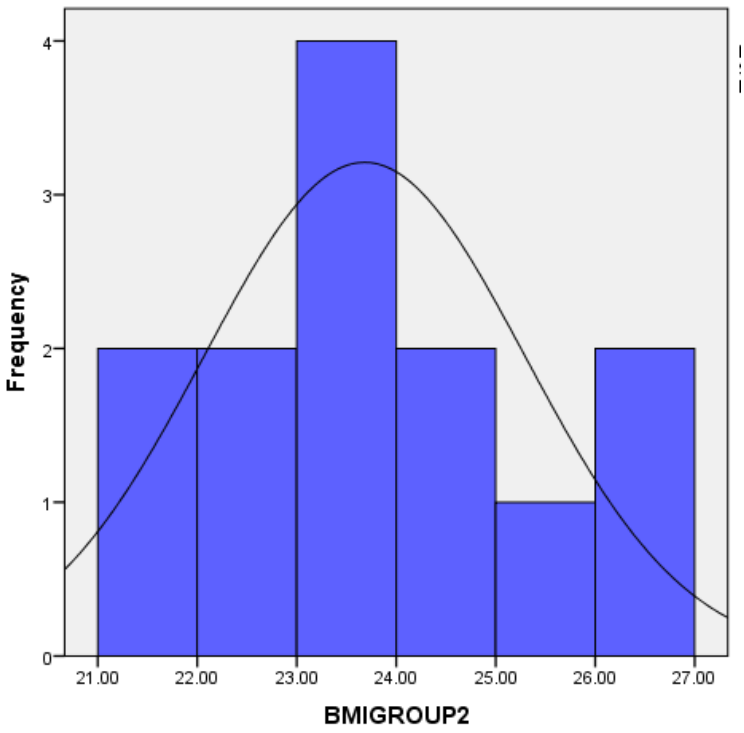
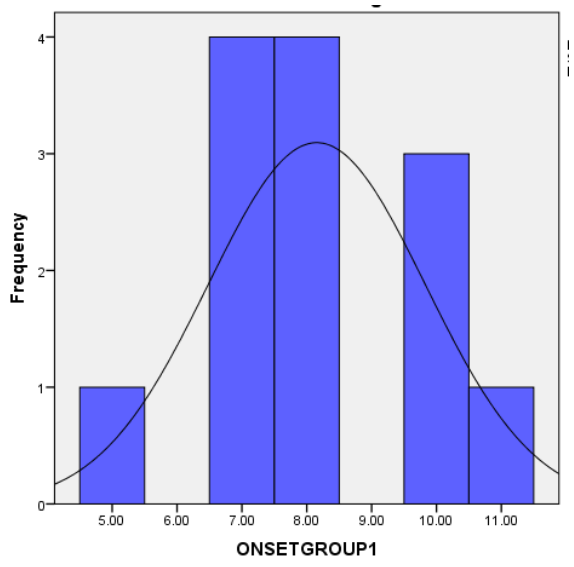


Table 4 - There were 13 patients in group 1 & group 2 with mean age and SD of Onset of stroke

	Group 1	Group 2
Mean	8.15	9.15
SD	1.67	1.51

Graph 4 - Normality distribution graph of Onset of stroke of Group 1 & Group 2.



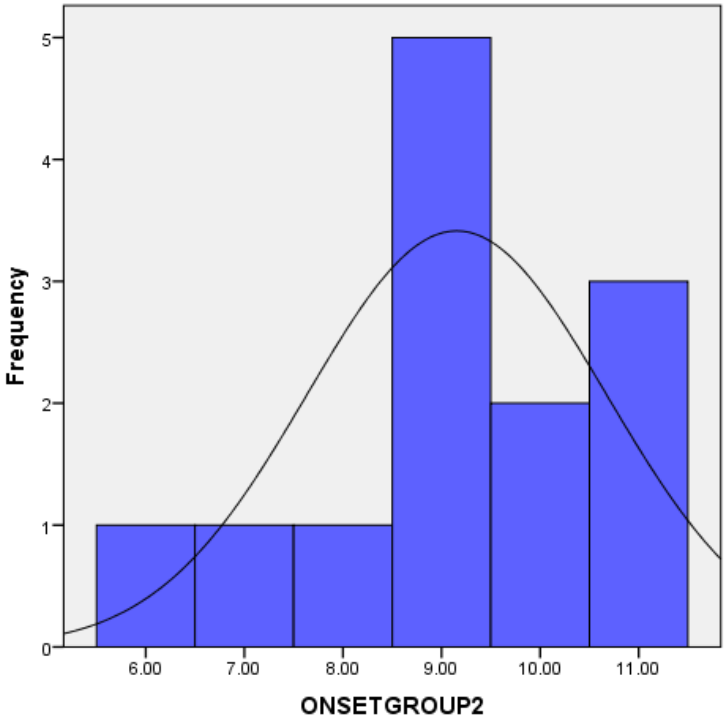
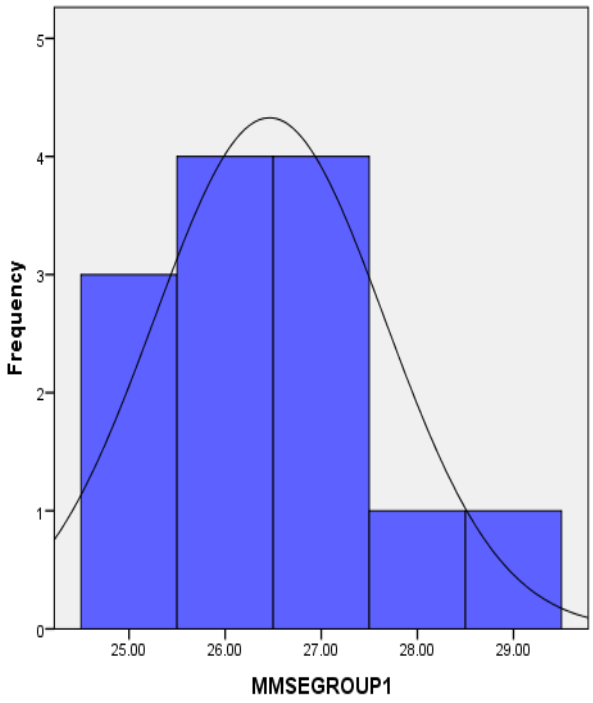
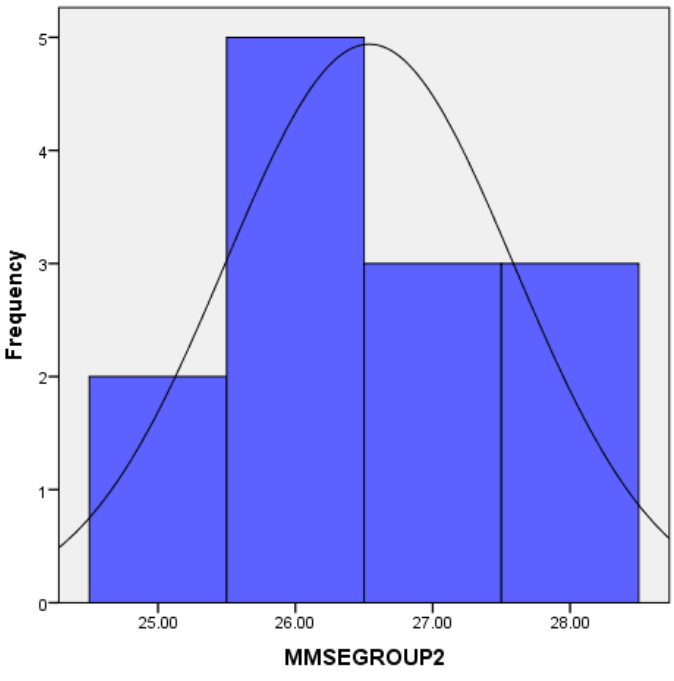


Table 5 - There were 13 patients in group 1 & group 2 with mean age and SD of MMSE

	Group 1	Group 2
Mean	26.46	26.54
SD	1.19	1.05

Graph 5 - Normality distribution graph of MiniMental Status Examination of Group 1 & Group 2





Comparison of Pre- intervention and Post intervention scores of Group 1

Table 6: Comparison of pre and post intervention scores of Group 1

Variables	Scores		t	P*
	Pre Mean (SD)	Post Mean (SD)		
Dynamic Gait Index(DGI)	9.30 ±1.03	9.92±0.95	3.41	0.05
Berg Balance Scale(BBS)	33.92 ±3.94	36.76±3.44	-8.97	0.00
Wisconsin Gait Scale(WGS)	31.79±2.43	30.53±2.72	6.76	0.00

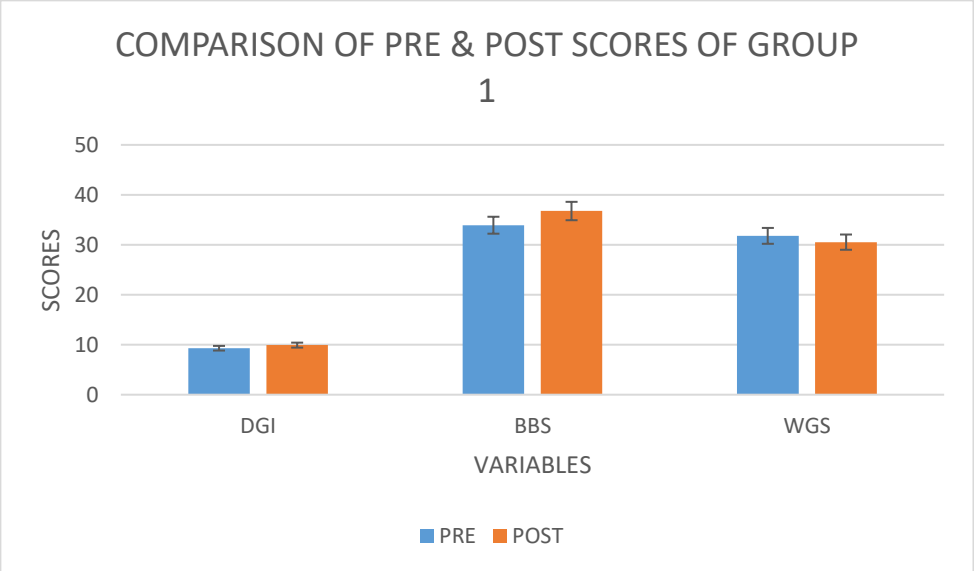
The comparison of pre intervention scores (mean=9.30, SD=1.03) and post intervention scores (mean=9.92, SD=0.95) of dynamic gait index(DGI) for Group 1 showed significant difference (t=-3.41, p=0.05)

The comparison of pre intervention scores (mean=33.92, SD=3.94) and post intervention scores (mean=36.76, SD=3.44) of Berg Balance

scale(BBS) for Group 1 showed significant difference (t= -8.97, p=0.00)

The comparison of pre intervention scores (mean=31.79, SD=2.43) and post intervention scores (mean=30.53, SD=2.72) of Wisconsin Gait Scale(WGS) for Group 1 showed significant difference (t=6.76, p=0.00)

Graph 6 - comparison of pre & post score of group 1



Comparison of Pre- intervention and Post intervention scores of Group 2

Table 7: Comparison of pre and post intervention scores of Group 2

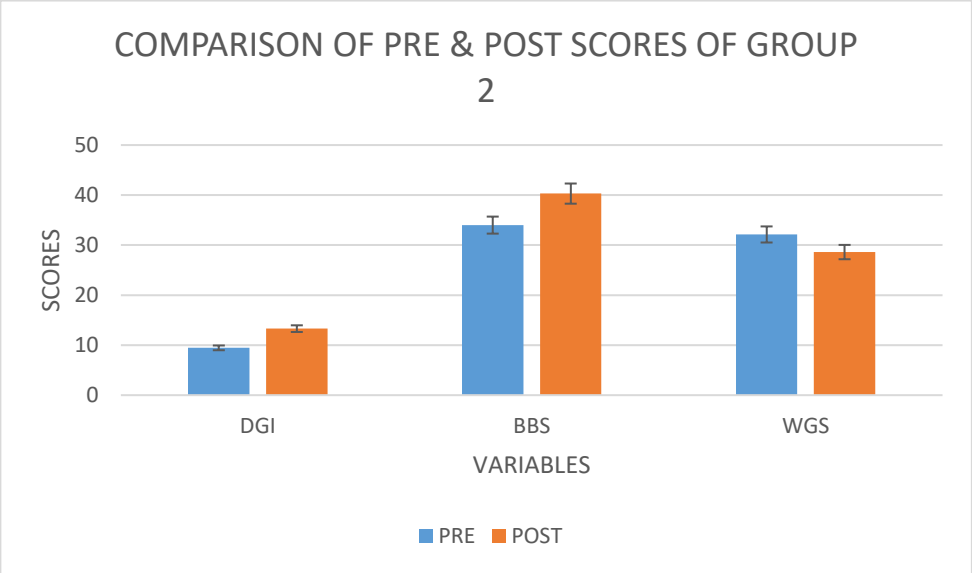
Variables	Scores		t	P*
	Pre Mean (SD)	Post Mean (SD)		
Dynamic Gait Index(DGI)	9.46±0.96	13.30±0.94	-12.98	0.00
Berg Balance Scale(BBS)	34±2.70	40.30±2.05	-17.28	0.00
Wisconsin Gait Scale(WGS)	32.13±2.28	28.61±2.44	19.83	0.00

The comparison of pre intervention scores (mean=9.46, SD=0.96) and post intervention scores (mean=13.30, SD=0.94) of dynamic gait index(DGI) for Group 1 showed significant difference (t=-12.98, p=0.00)

The comparison of pre intervention scores (mean=34.00, SD=2.70) and post intervention scores (mean=40.30, SD=2.05) of Berg Balance scale(BBS) for Group 1 showed significant difference (t= -17.28, p=0.00)

The comparison of pre intervention scores (mean=32.13, SD=2.28) and post intervention scores (mean=28.61, SD=2.44) of Wisconsin Gait Scale(WGS) for Group 1 showed significant difference (t=19.83, p=0.00)

Graph 7 - comparison of pre & post score of group 2

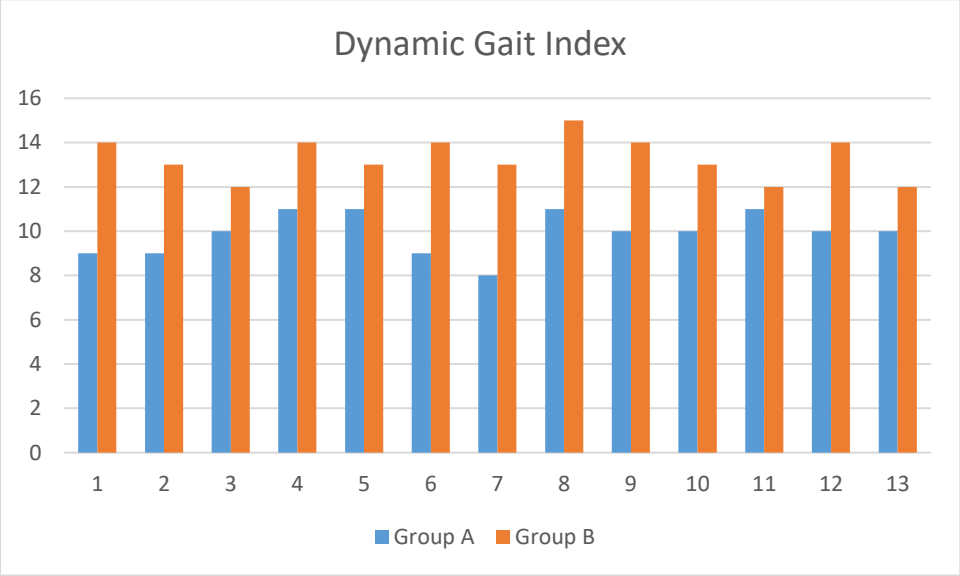


Comparison of mean change scores of Group 1 and Group 2

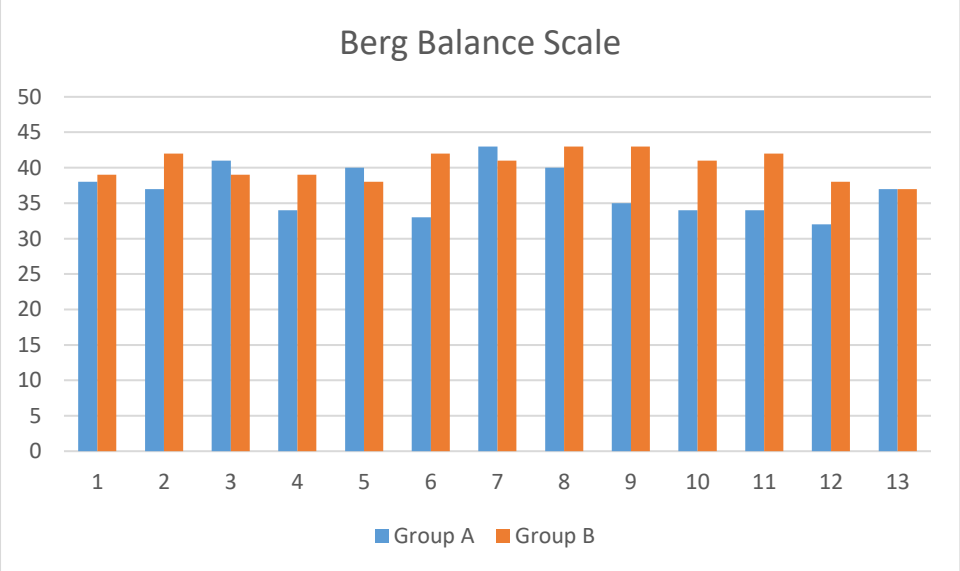
Table 8: Comparison of mean change of scores in group 1 and group 2

Variables	Group1 (n=10)		Group2(n=10)		Mean Difference	t	P*
	Pre Mean (SD)	Post Mean (SD)	Pre Mean (SD)	Post Mean (SD)			
Dynamic Gait Index(DGI)	9.30 ±1.03	9.92±0.95	9.46±0.96	13.30±0.94	3.38	-9.07	0.00
Berg Balance Scale(BBS)	33.92 ±3.94	36.76± 3.44	34±2.70	40.30±2.05	3.53	-3.18	0.04
Wisconsin Gait Scale(WGS)	31.79±2.43	30.53± 2.72	32.13±2.28	28.61±2.44	1.92	1.89	0.71

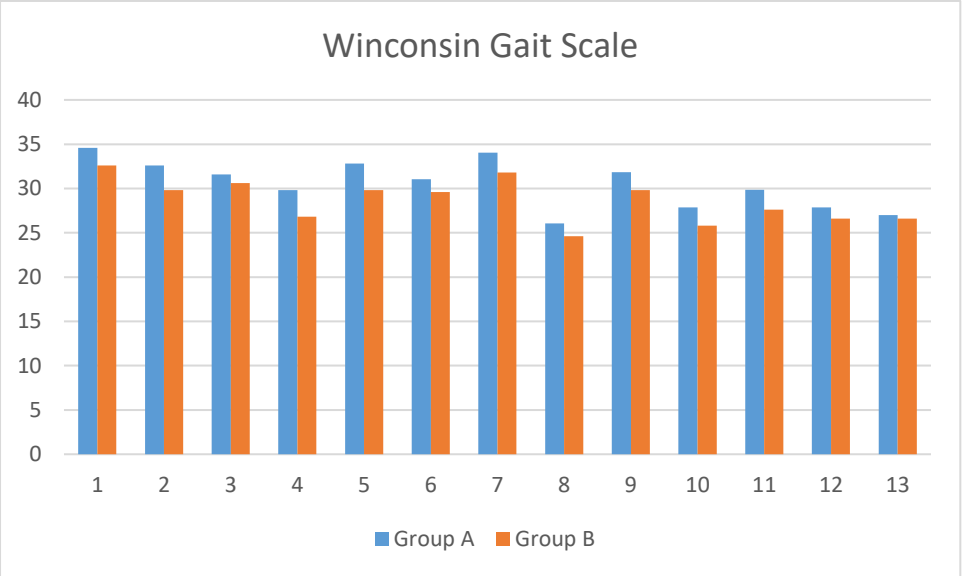
Graph 8 - comparison of post score of DGI of Group 1 & 2



Graph 9 - comparison of post score of BBS of Group 1 & 2



Graph 10- comparison of post score of WGS of Group 1 & 2



The comparison of mean change scores of dynamic gait index(DGI) between Group 1 (mean=9.92, SD=0.95) and Group 2 (mean=13.30, SD=0.94) showed significant difference (MD=3.38 t = 9.07, P=0.00) (Table 1.5, Figure 1.16).

The comparison of mean change scores of Berg Balance scale(BBS) between Group 1 (mean=36.76, SD=3.44) and Group 2 (mean=40.30, SD=2.05) showed significant difference (MD=3.53 t = -3.18, P=0.004)

The comparison of mean change scores of Wisconsin Gait Scale(WGS) between Group 1 (mean=30.53, SD=2.72) and Group 2 (mean=28.61, SD=2.44) showed no significant difference (MD=1.92 t = 1.89, P=0.071)

DISCUSSION

The present study investigated the comparative effects of two different lower-limb rehabilitation approaches on gait and balance in stroke survivors. The novelty of the study lies in its focus on comparing whole-limb versus segmental constraint induced movement therapy technique . Unlike previous studies that predominantly evaluated single approaches to constraint-induced movement therapy or generalized gait training, this study examined whether segmental or whole-limb m-CIMT technique training would lead to superior improvements in balance and gait quality. By doing so, it provides clinically relevant evidence on tailoring rehabilitation strategies according to patient needs and therapy goals.

The result of within group comparison show significant improvement of gait and balance in both experimental group 1 & 2. this could be due to intensive practice duration , constraint usage , type of constraint and constraint length.**(kalio et al 2014**) (64)

Gait measured by DGI &WGS of lower limb extremities showed significant improvement in both Experimental Groups. This is might be cause of after CVA many people tend to neglect the affected side of their body , which can worsen their symptoms . However with constraint therapy , which encourages the use of the affected limb . this technique help in increase awareness and control of their body , particularly in the trunk and limb and visual feedback. As a result there will be possible influence on gait(**fuzaro AC et al 2012**) (65)

As per **Numata et al , Marklund &Klassbo et al** their study showed significant improvement of motor function, balance &walking with implementation of cimt technique on stroke subjects.

The result of the study show significant improvement in BBS in with in group study in both the experimental group. This primary thought behind this could be **Wang et al** performed a study and found that cimt enhances walking speed and balance because it promote functional reorganization & neural plasticity in brain and compensatory mechanism adopted by the damaged area of the brain.(65,66,67,68)

However, between-group analysis revealed that Group 2 achieved significantly greater improvements in DGI and BBS, suggesting that this approach was more effective in enhancing dynamic mobility and balance. In contrast, no significant difference was observed in WGS between groups, indicating that both interventions were equally effective in improving gait quality. This selective difference implies that while both methods are beneficial, targeted training strategies may yield superior improvements in functional stability and mobility outcomes.

In contrast, the Wisconsin Gait Scale evaluates qualitative aspects of gait patterns, such as limb movement, weight shift, and step length, which are influenced not only by motor learning but also by underlying biomechanical impairments, spasticity, and compensatory strategies(69) . Both interventions may have been equally effective in addressing these fundamental gait parameters, leading to within-group improvements but no significant between-group differences. This suggests that gait quality may be less sensitive to

short-term intervention differences, whereas balance and dynamic mobility are more responsive to targeted, intensive training.

Postural symmetry is crucial for effective ambulation. Increasing weight bearing on the paretic limb through mCIMT promotes postural and gait symmetry by enhancing extensor activity via Ib afferent feedback. Greater limb loading, especially in late stance, boosts sensory input from plantar flexors, inhibits quadriceps activity, and facilitates knee flexion—reducing compensatory strategies like stiff-knee gait. Thus, rehabilitation should primarily aim to increase paretic limb loading to restore gait symmetry and balance after stroke.(56)

One of the key strengths of this study is its randomized controlled design, along with the use of detailed outcome measures that captured important aspects of recovery such as gait, balance, and walking ability. A further strength is that the therapy was not limited to the training sessions but was also carried over into patients' daily lives, helping the improvements to become more meaningful and lasting through reinforced motor learning. Finally, this work is the first to explore and compare two different constraint methods to boost weight bearing on the affected lower limb and strengthen the representation of the paretic limb, adding new perspectives to rehabilitation for stroke patients.

CONCLUSION

CONCLUSION

The study concluded that full modified constraint induced movement therapy (m-cimt) in greater improvement in gait and balance in the subjects with ischemic stroke compared to the segmental modified constraint induced movement therapy.

LIMITATIONS & RECOMMENDATIONS FOR FUTURE STUDY

LIMITATION OF THE STUDY

1. Sample size was limited.
2. Lack of psycho-social or quality of life assessment
3. Lack of objective gait or balance measures
4. Spatio-temporal parameters were not assessed

FUTURE RESEARCH SCOPE

1. Future studies should be conducted using large samples.
2. Integration of Technology based Assessments.
3. Evalution of impact of m-cimt in dfferent stroke phases.
4. Single joint segmental M-cimt can be conducted.

SUMMARY

Summary of the study

Cardiovascular disease, particularly ischemic stroke, remains a major global health challenge and is the second leading cause of mortality worldwide. A significant number of stroke survivors experience persistent impairments in gait and balance due to disrupted neural control, muscle weakness, and abnormal movement patterns. These functional deficits severely limit mobility, independence, and the ability to perform daily activities.

This study investigated the effects of full versus segmental modified constraint-induced movement therapy (m-CIMT) on lower extremity function—specifically gait and balance—in individuals with ischemic stroke. Both intervention groups showed improvements following the therapy. However, participants who received full m-CIMT demonstrated greater improvements in overall gait and balance compared to those who received segmental m-CIMT. While gait pattern improved in both groups, the difference in this specific aspect was less pronounced.

The findings of this study indicate that full m-CIMT is an effective therapeutic approach for enhancing lower limb function in stroke rehabilitation. Based on these results, full m-CIMT may be recommended as a clinical tool to improve gait and balance in individuals recovering from ischemic stroke.

STATEMENT OF FUNDING

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ANNEXURES: I

CONSENT FORM

Study Title: Comparative The Impact Of Full Versus Segmental Modified Constraint Induced Movement Therapy on Lower Limb Function in Stroke Patients - A Randomized Clinical Trial

Study Number:

Subject 's Name: _____ Subject 's Initials: _____

Date of Birth / Age: _____

Address of the Subject_____

Qualification _____

Occupation: Student/Self-Employed/ Service/Housewife/Others (Please tick as appropriate)

Annual Income of the subject not applicable if applicable

Name and address of the nominee(s) and his relation to the subject _____NA_____ (for the purpose of compensation in case of trial related death).]

Please initial box
(Subject)

(i) I confirm that I have read and understood the information sheet dated _____ [ ] for the above study and have had the opportunity to ask questions.

(ii) I understand that my participation in the study is voluntary and that I am [ ] free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

(iii) I understand that the Sponsor of the clinical trial, others working on the [ ]

Sponsor 's behalf, the Ethics Committee and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and any further research that may be conducted in relation to it, even if I withdraw from the trial. I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published.

(iv) I agree not to restrict the use of any data or results that arise from this [ ] study provided such a use is only for scientific purpose(s)

(v) I agree to take part in the above study. [ ]

Signature (or Thumb impression) of the Subject/Legally Acceptable Representative:

_____ Date: _____/ ____/ _____

Signatory 's Name: _____

Signature of the Investigator: _RASHMI REKHA BISOI

Date: Study Investigator 's Name: _____

ANNEXTURE-II

ସମ୍ମତିପତ୍ର

ପ୍ରତିବନ୍ଧିତ ଗତି ଉତ୍ପ୍ରେରିତ ଚିକିତ୍ସା ପ୍ରଣାଳୀର ପରିବର୍ତ୍ତିତ ପ୍ରୟୋଗ ଦ୍ୱାରା ଘଟିଥିବା ଘାତଗ୍ରସ୍ତ ରୋଗୀଙ୍କର ପାଁଖ ଅଂଗର କାର୍ଯ୍ୟକୁ ନେଇ ତୁଳନାତ୍ମକ ପ୍ରଭାବ – ଗୋଟିଏ ଯାଦୃଚ୍ଛିକ ନିୟନ୍ତ୍ରିତ ପରୀକ୍ଷା।

ଅଧ୍ୟୟନ ସଂଖ୍ୟା: ବ୍ୟକ୍ତିର ନାମ: _____ ଜନ୍ମତାରିଖ / ଆୟୁ: _____ ବ୍ୟକ୍ତିର ପ୍ରତିଷ୍ଠିତି: _____ ବ୍ୟବସାୟ: ଛାତ୍ର/ସ୍ୱୟଂ-ରୁଜି/ ସେବା/ଗୃହିଣୀ/ଅନ୍ୟ (ଯଥାଯଥା ପ୍ରତିଚ୍ଛିନ୍ନ କରନ୍ତୁ)

I. ମୁଁ ଏହି ଅଧ୍ୟୟନ ସହିତ ସମ୍ବନ୍ଧିତ ସୂଚନା ପତ୍ରକୁ ଅଧ୍ୟୟନ କରିଛି ଓ ମୋତେ ପ୍ରଶ୍ନ ପଚାରିବାର ସୁଯୋଗ ମିଳିଛି ଯାହାକି _____ ତାରିଖରେ ପ୍ରସ୍ତୁତ ଥିଲା [ ]।

II. ମୁଁ ବୁଝି ପାଇଛି ଯେ ଏହି ଅଧ୍ୟୟନରେ ଅଂଶଗ୍ରହଣ କରିବା ସ୍ୱତନ୍ତ୍ର ଏବଂ ମୁଁ [ ] ସମୟ ଯେତେବେଳେ ଚାହାଁଦିଲେ ଅଂଶଗ୍ରହଣକୁ ବାତିଲ୍ କରିପାରିବି, କୌଣସି କାରଣ ଦିଆ ନାହିଁ ଓ ମୋର ଚିକିତ୍ସା ବା ଆଇନ ସହିତ ସମ୍ପୃକ୍ତ ଅଧିକାର ପ୍ରଭାବିତ ହେବ ନାହିଁ।

III. ମୁଁ ବୁଝିପାଇଛି ଯେ ଏହି ନୀତି ଓ ନିୟମରେ ଏଥିକ୍ସ କମିଟି ଏବଂ ନିୟମକ ଅଧିକାରୀଗଣ ମୋର ସ୍ୱାସ୍ଥ୍ୟ ରେକର୍ଡଗୁଡିକୁ ପ୍ରବେଶ କରିପାରିବେ ସେହି ସମୟରେ ଯାହାକି ବର୍ତ୍ତମାନ ଅଧ୍ୟୟନ ଓ ତାହାର ପରେ ଯେକୌଣସି ଅଧ୍ୟୟନ ପାଇଁ, ଯଦି ସେହି ସମୟରେ ମୁଁ ଅନୁଷ୍ଠାନ ଛାଡିବି, ତେବେ ମୁଁ ଏହି ପ୍ରବେଶକୁ ସମ୍ମତି ଦେଉଛି। ଏହି ସମୟରେ, ମୋର ଚିହ୍ନ ଉଦ୍ଧାର କରାଯିବେ ନାହିଁ।

IV. ମୁଁ ସମ୍ମତି ଦେଉଛି ଯେ ଯେକୌଣସି ତଥ୍ୟ ବା ଫଳାଫଳ ଯାହାକି ଏହି [ ] ଅଧ୍ୟୟନରୁ ଉତ୍ପନ୍ନ ହେବ, ସେଗୁଡିକୁ ବୈଜ୍ଞାନିକ ଉଦ୍ଦେଶ୍ୟ ପାଇଁ ବ୍ୟବହାର କରାଯିବାକୁ ମୁଁ କ୍ଷମା କରିବି।

V. V. ମୁଁ ଏହି ଅଧ୍ୟୟନରେ ଅଂଶଗ୍ରହଣ କରିବାକୁ ସମ୍ମତି ଦେଉଛି। [ ]

ସାଇନେଚର (କିମ୍ବା ଅଙ୍ଗୁଠା ଚିହ୍ନ) ପ୍ରତିନିଧି/ସ୍ୱୀକୃତ ପ୍ରତିନିଧି:

ତାରିଖ: _____/ ____/ _____ ସାଇନେଚର ପ୍ରତିନିଧି: _____

ଅଧ୍ୟୟନ ପରୀକ୍ଷକର ସାଇନେଚର: _____ ତାରିଖ: _____/ _____/ _____ **ଅଧ୍ୟୟନ ପରୀକ୍ଷକର ନାମ:** _____

ସାକ୍ଷୀଙ୍କର ସାଇନେଚର: _____ ତାରିଖ: _____/ _____/ _____ **ସାକ୍ଷୀଙ୍କର ନାମ:** _____

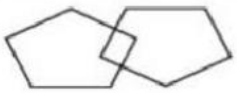
**ଏହି ପ୍ରତିନିଧି ସୂଚନା ପତ୍ର ଓ ସମ୍ପୂର୍ଣ୍ଣ ସମ୍ମତିପତ୍ର ଆସିଥିବା ସମୟରେ ବ୍ୟକ୍ତି କିମ୍ବା ତାଙ୍କର ସହାୟକ କୁ ଦିଆଯିବ।*

ANNEXTURE-III

Mini-Mental State Examination (MMSE)

Patient's Name: _____ Date: _____

Instructions: Score one point for each correct response within each question or activity.

Maximum Score	Patient's Score	Questions
5		"What is the year? Season? Date? Day? Month?"
5		"Where are we now? State? County? Town/city? Hospital? Floor?"
3		The examiner names three unrelated objects clearly and slowly, then the instructor asks the patient to name all three of them. The patient's response is used for scoring. The examiner repeats them until patient learns all of them, if possible.
5		"I would like you to count backward from 100 by sevens." (93, 86, 79, 72, 65, ...) Alternative: "Spell WORLD backwards." (D-L-R-O-W)
3		"Earlier I told you the names of three things. Can you tell me what those were?"
2		Show the patient two simple objects, such as a wristwatch and a pencil, and ask the patient to name them.
1		"Repeat the phrase: 'No ifs, ands, or buts.'"
3		"Take the paper in your right hand, fold it in half, and put it on the floor." (The examiner gives the patient a piece of blank paper.)
1		"Please read this and do what it says." (Written instruction is "Close your eyes.")
1		"Make up and write a sentence about anything." (This sentence must contain a noun and a verb.)
1		"Please copy this picture." (The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and two must intersect.) 
30		TOTAL

ANNEXURE-IV

DYNAMIC GAIT INDEX

		Date	Date	Date	Date
A.	Gait level surface				
B.	Change in gait speed				
C.	Gait with horizontal head turns				
D.	Gait with vertical head turns				
E.	Gait and pivot turn				
F.	Step over obstacle				
G.	Step around obstacle				
H.	Stairs				
	TOTAL SCORE				

Patient Name: _____ Signature: _____ Date: _____

A. Gait Level Surface

Instructions: Walk at your normal speed from her to the next mark (20 feet). Check th lowest category that applies.

- ☐ 0. Severe Impairment: Cannot walk 20 ft. without assistance, severe gait deviations, or imbalance.
- ☐ 1. Moderate Impairment: Walks 20 feet, slow speed, abnormal gait pattern, evidence for imbalance.
- ☐ 2. Mild Impairment: Walks 20 feet, uses assistive devices, slower speed, mild gait deviations.
- ☐ 3. Normal: Walks 20 feet, no assistive devices, good speed, no evidence of imbalance, normal gait pattern.

B. Change in Gait Speed

Instructions: Begin walking at your normal pace (for 5 ft.). When I tell you "GO", walk as fast as you can (for 5 ft.). When I tell you "SLOW", walk as slowly as you can (for 5 ft.). Check the lowest category that applies.

- ☐ 0. Severe Impairment: Cannot change speeds, or loses balance and has to reach for wall or be caught.
- ☐ 1. Moderate Impairment: Makes only minor adjustments to walking speed or accomplishes a change in speed with significant gait deviations, or changes speed but has significant gait deviations, or changes speed but loses balance but is able to recover and continue walking.
- ☐ 2. Mild Impairment: Able to change speed but demonstrates mild gait deviations, or no gait deviations but unable to achieve a significant change in velocity, or uses an assitive device.
- ☐ 3. Normal: Able to smoothly change walking speed without loss of balance or gait deviation. Shows significant difference in walking speeds between normal, fast, and slow speeds.

C. Gait with Horizontal Head Turns

Instructions: Begin walking at your normal pace. When I tell you "look right", keep walking straight, but turn your head to the right. Keep looking to the right until I tell you "look left", then keep walking straight and turn your head to the left. Keep your head to the left until I tell you "look straight". then keep walking straight but return your head to the center. Check the lowest category that applies.

- ☐ 0. Severe Impairment: Performs task with severe disruptions of gait (i.e. - staggers outside 15 inch path, loses balance, stops, reaches for wall).
- ☐ 1. Moderate Impairment: Performs head turns with moderate change in gait velocity, slows down, staggers but revovers, can continue to walk.
- ☐ 2. Mild Impairment: Performs head turn somoothly with slight change in gait velocity (i.e. - minor disruption to smooth gait path or uses walking aid).
- ☐ 3. Normal: Performs head turns smoothly with no change in gait.

D. Gait with Vertical Head Turns

Instructions: Begin walking at your normal pace. When I tell you "look up", keep walking straight, but tip your head and look up. Keep looking up untill I tell you "look down", then keep walking straight and turn your head down. Kepp your head down until I tell you "look staright", then keep walking straight but return your head to the center. Check the lowest category that applies.

- ☐ 0. Severe Impairment: Performs task with severe disruptions of gait (i.e. - staggers outside 15 inch path, loses balance, stops, reaches for wall.
- ☐ 1. Moderate Impairment: Performs task with moderate change in gait velocity, slows down, staggers but recovers, can continue to walk.
- ☐ 2. Mild Impairment: Performs task with slight change in gait velocity (i.e. - minor diruption to smooth gait path or uses walking aid).
- ☐ 3. Normal: Performs head turns with no change in gait.

E. Gait and Pivot Turn

Instructions: Begin walking at your normal pace. When I tell you "stop and turn", turn as quickly as you can to face the opposite direction and stop. Check the lowest category that applies.

- ☐ 0. Severe Impairment: Cannot turn safely, requires assistance to turn and stop.
- ☐ 1. Moderate Impairment: Turns slowly, requires verbal cueing, requires several small steps to catch balance following turn.
- ☐ 2. Mild Impairment: Pivot turns safely in greater than 3 seconds and stops with no loss of balance.
- ☐ 3. Normal: Pivots and turns safely within 3 seconds and stops quickly with no loss of balance.

F. Step over Obstacle

Instructions: Begin walking at your normal speed. When you come to the shoebox, step over it, not around it, and keep walking. Check the lowest category that applies.

- ☐ 0. Severe Impairment: Cannot perform activity without assistance.
- ☐ 1. Moderate Impairment: Able to step over box, but must stop, then step over. May require verbal cueing.
- ☐ 2. Mild Impairment: Able to step over box, but must slow down and adjust steps to clear box safely.
- ☐ 3. Normal: Able to step over box without changing gait speed; no evidence of imbalance.

G. Step around Obstacles

Instructions: Begin walking at you normal speed. When you come to the first cone (about 6 ft. away), walk around the right side of it. When you come to the second cone (about 6 ft. past first cone), walk around it to the left. Check the lowest category that applies.

- ☐ 0. Severe Impairment: Unable to clear cones, walks into one or both cones, or reqires physical assistance.
- ☐ 1. Moderate Impairment: Able to clear cones but must significantly slow speed to accomplish task, or requires verbal cueing
- ☐ 2. Mild Impairment: Able to step around both cones, but must slow down and adjust steps to clear cones.
- ☐ 3. Normal: Able to walk around cones safely without changing gait speed; no evidence of imbalance.

H. Stairs

Instructions: Walk up these stairs as you would at home (i.e. - using the rail if necessary) At the top, turn around and walk do
Check the lowest category that applies.

- ☐ 0. Severe Impairment: Cannot perform safely.
- ☐ 1. Moderate Impairment: Two feet to a stair, must use rail.
- ☐ 2. Mild Impairment: Alternating feet, must use rail.
- ☐ 3. Normal: Alternating feet, no rail.

ANNEXTURE-V

BERG BALANCE SCALE

Item description score (0-4)

2. Sitting to standing

3. Standing unsupported

4. Sitting unsupported

5. Standing to sitting

6. Transfers

7. Standing with eyes closed

8. Standing with feet together

9. Reaching forward with outstretched arm

10.Retrieving object from floor

11.Turning to look behind

12.Turning 360 degrees

13.Placing alternate foot on stool

14.Standing with one foot in front

TOTAL SCORE (Maximum = 56)

ANNEXTURE-VI

Wisconsin Gait Scale (WGS)

(1) walking towards the observer

(2) walking away from the observer

(3) from the side Measures (14 submeasures):

(4) (1) stance phase of the affected leg (5 submeasures)

(2) toe off of the affected leg (2 submeasures)

(3) swing phase of the affected leg (6 submeasures)

(4) heel strike of the affected leg (1 submeasure) Stance phase submeasures: (1) use of hand held gait aid (2) stance time on impaired side (3) step length of the unaffected side (4) weight shift to the affected side with or without a gait aid (5) stance width (measure distance between feet prior to toe off of affected foot) Toe off submeasures: (6) guardedness (pause prior to advancing affected leg) (7) hip extension of affected side (observe gluteal creases from behind the subject) Swing phase submeasures: (8) external rotation during intial swing (9) circumduction at mid swing (observe path of affected heel) (10) hip hiking at mid swing (11) knee flexion from toe off to mid swing (12) toe clearance (13) pelvis rotation Heel strike affected leg submeasure: (14) initial foot contact

ANNEXTURE-VII

ASSESSMENT

DEMOGRAPHY:

Name……Age……Sex…

Occupation……Address……

…….

Hand dominance……

Chief complaints

▪ **HISTORY:**

History of present illness

Onset:

Duration & Frequency:

Progression:

Sign & symptoms:

Associated problem:

Investigation:

Aggravating/relieving factors:

Present physiotherapy management:

Past medical history:

Personal history:

Family history:

Socio economic history:

Environmental history:

OBSERVATION:

Body built:

Attitude of limb:

Posture

• Levels of ears:

• Levels of shoulder:

• Levels of ASIS:

Gait:

• External appliances/ Assistive device/ Orthosis:

• Scar/ Contracture/ Deformity/Muscle wasting:

PALPATION:

Skin temperature:

Muscle tone:

Abnormal bony prominence:

Edema

EXAMINATION:

a)Vital signs

• Temperature:

• Blood pressure:

• Respiratory rate:

• Heart rate:

b) Cognitive ability (Mini-Mental State Examination)

c) Cranial nerve examination

d) Sensory

examination:

1.Superficial

2. Deep

3. Cortical sensation:

e) Motor examination:59

1. Muscle tone

2. Muscle power

3. Range of motion

4. Limb length discrepancy

5. Tightness/contracture/ deformity

g) Reflex examination (Superficial/Deep)

h) Balance (Berg Balance Scale)

i) Co-ordination

• Non equilibrium

1. finger to nose

2. Alternate pronation and supination

3. heel shin test

• Equilibrium

j) Gait examination

1. walking on heel/ walking on toes

2. Tandem walking

• Dynamic gait index

l) Functional evaluation:

• Fugl-Meyer assessment for lower extremity

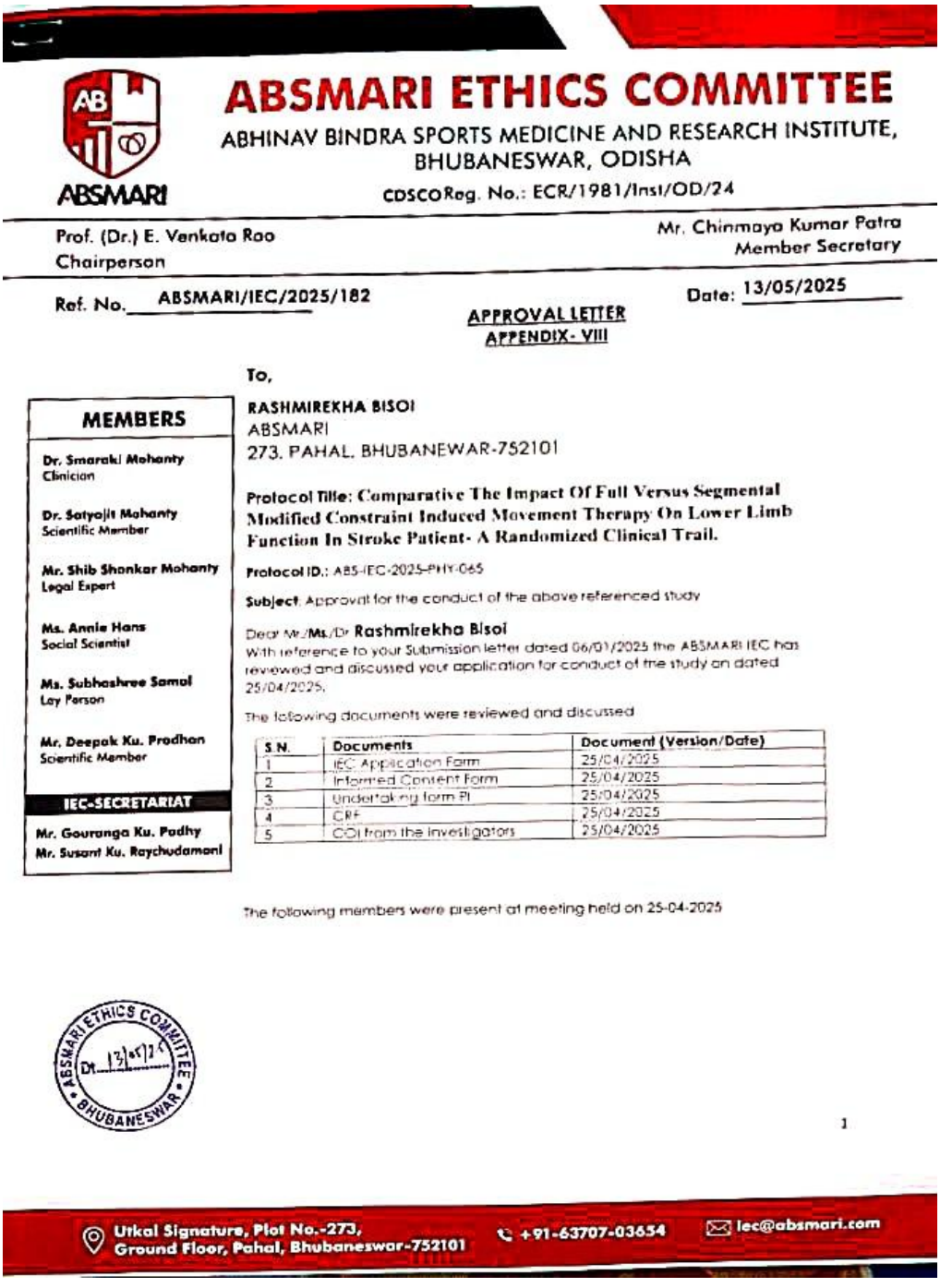
• Stroke specific quality of life

▪ **Diagnosis:**

▪ **Problem list:**

▪ **Physiotherapy interventions:**

ANNEXURE-VIII



ABSMARI ETHICS COMMITTEE

ABHINAV BINDRA SPORTS MEDICINE AND RESEARCH INSTITUTE, BHUBANESWAR, ODISHA

CDSCO Reg. No.: ECR/1981/Insl/OD/24

Prof. (Dr.) E. Venkata Rao
Chairperson

Mr. Chinmaya Kumar Patra
Member Secretary

Ref. No. ABSMARI/IEC/2025/182

Date: 13/05/2025

APPROVAL LETTER
APPENDIX- VIII

To,

RASHMIREKHA BISOI
ABSMARI
273, PAHAL, BHUBANEWAR-752101

Protocol Title: Comparative The Impact Of Full Versus Segmental Modified Constraint Induced Movement Therapy On Lower Limb Function In Stroke Patient- A Randomized Clinical Trail.

Protocol ID.: ABS-IEC-2025-PHY-065

Subject: Approval for the conduct of the above referenced study

Dear Mr./Ms./Dr **Rashmirekha Bisoi**
With reference to your Submission letter dated 06/01/2025 the ABSMARI IEC has reviewed and discussed your application for conduct of the study on dated 25/04/2025.

The following documents were reviewed and discussed

S.N.	Documents	Document (Version/Date)
1	IEC Application Form	25/04/2025
2	Informed Consent Form	25/04/2025
3	Undertaking form PI	25/04/2025
4	CRF	25/04/2025
5	COI from the investigators	25/04/2025

The following members were present at meeting held on 25-04-2025

MEMBERS

Dr. Smaraki Mohanty
Clinician

Dr. Satyajit Mohanty
Scientific Member

Mr. Shib Shankar Mohanty
Legal Expert

Ms. Annie Hans
Social Scientist

Ms. Subhashree Samal
Lay Person

Mr. Deepak Ku. Pradhan
Scientific Member

IEC-SECRETARIAT

Mr. Gouranga Ku. Padhy
Mr. Susant Ku. Raychudamani

ABSMARI ETHICS COMMITTEE Dt. 13/05/25 BHUBANESWAR

1

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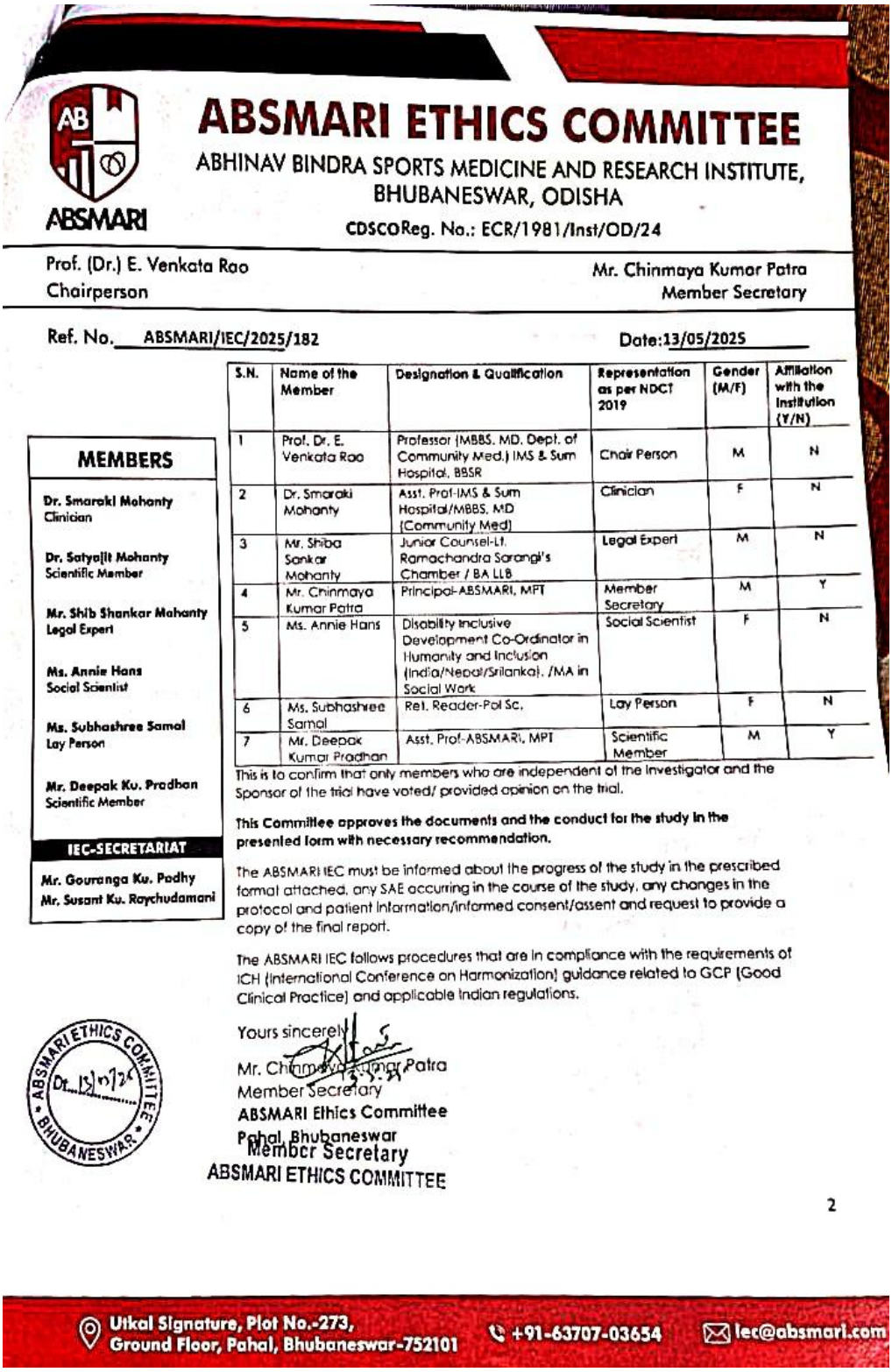
ANNEXURE-IX



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Ref. No. ABSMARI/IEC/2025/182

Date:13/05/2025

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Mr. Deepak Ku. Pradhan
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IEC-SECRETARIAT

Mr. Gouranga Ku. Padhy
Mr. Susant Ku. Raychudamani

S.N.	Name of the Member	Designation & Qualification	Representation as per NDCT 2019	Gender (M/F)	Affiliation with the Institution (Y/N)
1	Prof. Dr. E. Venkata Rao	Professor (MBBS, MD, Dept. of Community Med.) IMS & Sum Hospital, BBSR	Chair Person	M	N
2	Dr. Smaraki Mohanty	Asst. Prof-IMS & Sum Hospital/MBBS, MD (Community Med)	Clinician	F	N
3	Mr. Shiba Sankar Mohanty	Junior Counsel-Lt. Ramachandra Sarangi's Chamber / BA LLB	Legal Expert	M	N
4	Mr. Chinmaya Kumar Patra	Principal-ABSMARI, MPT	Member Secretary	M	Y
5	Ms. Annie Hans	Disability Inclusive Development Co-Ordinator in Humanity and Inclusion (India/Nepal/Srilanka). /MA in Social Work	Social Scientist	F	N
6	Ms. Subhashree Samal	Ret. Reader-Pol Sc.	Lay Person	F	N
7	Mr. Deepak Kumar Pradhan	Asst. Prof-ABSMARI, MPT	Scientific Member	M	Y

This is to confirm that only members who are independent of the investigator and the Sponsor of the trial have voted/ provided opinion on the trial.

This Committee approves the documents and the conduct for the study in the presented form with necessary recommendation.

The ABSMARI IEC must be informed about the progress of the study in the prescribed format attached, any SAE occurring in the course of the study, any changes in the protocol and patient information/informed consent/assent and request to provide a copy of the final report.

The ABSMARI IEC follows procedures that are in compliance with the requirements of ICH (International Conference on Harmonization) guidance related to GCP (Good Clinical Practice) and applicable Indian regulations.

ABSMARI ETHICS COMMITTEE Dt. 13/05/25 BHUBANESWAR

Yours sincerely,

Mr. Chinmaya Kumar Patra
Member Secretary
ABSMARI Ethics Committee
Pahal, Bhubaneswar

Member Secretary
ABSMARI ETHICS COMMITTEE

2

Utkal Signature, Plot No.-273, Ground Floor, Pahal, Bhubaneswar-752101 +91-63707-03654 iec@absmari.com

ANNEXURE-X

Plagarism and AI Report

turnitin Page 2 of 37 - Integrity Overview Submission ID trn:oid:::1:3345454804

16% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Filtered from the Report

- Bibliography
- Quoted Text
- Cited Text
- Small Matches (less than 8 words)

Match Groups

- 58 Not Cited or Quoted 16%
  Matches with neither in-text citation nor quotation marks
- 0 Missing Quotations 0%
  Matches that are still very similar to source material
- 0 Missing Citation 0%
  Matches that have quotation marks, but no in-text citation
- 0 Cited and Quoted 0%
  Matches with in-text citation present, but no quotation marks

Top Sources

13% Internet sources
14% Publications
0% Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

No suspicious text manipulations found.

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

0% detected as AI

The percentage indicates the combined amount of likely AI-generated text as well as likely AI-generated text that was also likely AI-paraphrased.

Caution: Review required.

It is essential to understand the limitations of AI detection before making decisions about a student's work. We encourage you to learn more about Turnitin's AI detection capabilities before using the tool.

Detection Groups

- 0 AI-generated only 0%
  Likely AI-generated text from a large-language model.
- 0 AI-generated text that was AI-paraphrased 0%
  Likely AI-generated text that was likely revised using an AI-paraphrase tool or word spinner.

Disclaimer
Our AI writing assessment is designed to help educators identify text that might be prepared by a generative AI tool. Our AI writing assessment may not always be accurate (i.e., our AI models may produce either false positive results or false negative results), so it should not be used as the sole basis for adverse actions against a student. It takes further scrutiny and human judgment in conjunction with an organization's application of its specific academic policies to determine whether any academic misconduct has occurred.

Frequently Asked Questions

How should I interpret Turnitin's AI writing percentage and false positives?
The percentage shown in the AI writing report is the amount of qualifying text within the submission that Turnitin's AI writing detection model determines was either likely AI-generated text from a large-language model or likely AI-generated text that was likely revised using an AI paraphrase tool or word spinner.

False positives (incorrectly flagging human-written text as AI-generated) are a possibility in AI models.

AI detection scores under 20%, which we do not surface in new reports, have a higher likelihood of false positives. To reduce the likelihood of misinterpretation, no score or highlights are attributed and are indicated with an asterisk in the report (*%).

The AI writing percentage should not be the sole basis to determine whether misconduct has occurred. The reviewer/instructor should use the percentage as a means to start a formative conversation with their student and/or use it to examine the submitted assignment in accordance with their school's policies.

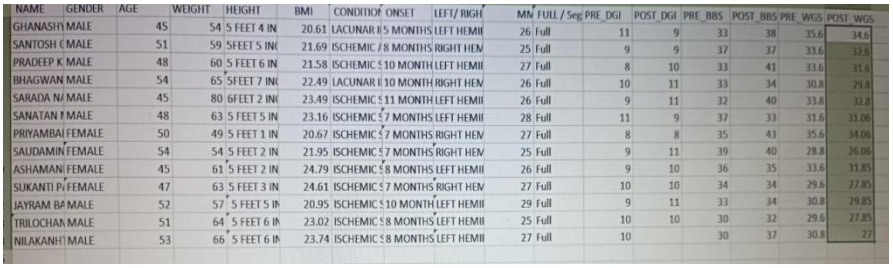
What does 'qualifying text' mean?
Our model only processes qualifying text in the form of long-form writing. Long-form writing means individual sentences contained in paragraphs that make up a longer piece of written work, such as an essay, a dissertation, or an article, etc. Qualifying text that has been determined to be likely AI-generated will be highlighted in cyan in the submission, and likely AI-generated and then likely AI-paraphrased will be highlighted purple.

Non-qualifying text, such as bullet points, annotated bibliographies, etc., will not be processed and can create disparity between the submission highlights and the percentage shown.

ANNEXURE- XII

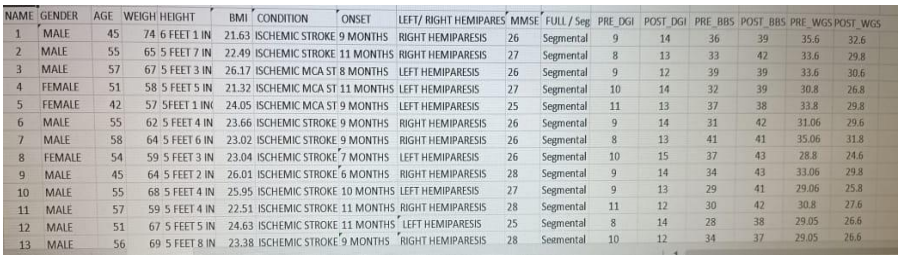
Master Chart

Group 1- Full m-CIMT



NAME	GENDER	AGE	WEIGHT	HEIGHT	BMI	CONDITIO	ONSET	LEFT/ RIGH	MN	FULL / Seg	PRE_DGI	POST_DGI	PRE_BBS	POST_BBS	PRE_WGS	POST_WGS
GHANASH	MALE	45	54	5 FEET 4 IN	20.61	LACUNAR I	5 MONTHS	LEFT HEMI	26	Full	11	9	33	38	35.6	34.6
SANTOSH	MALE	51	59	5FEET 5 IN	21.69	ISCHEMIC	8 MONTHS	RIGHT HEM	25	Full	9	9	37	37	33.6	32.6
PRADEEP K	MALE	48	60	5 FEET 6 IN	21.58	ISCHEMIC S	10 MONTH	LEFT HEMI	27	Full	8	10	33	41	33.6	31.6
BHAGWAN	MALE	54	65	5FEET 7 IN	22.49	LACUNAR I	10 MONTH	RIGHT HEM	26	Full	10	11	33	34	30.8	29.8
SARADA N	MALE	45	80	6FEET 2 IN	23.49	ISCHEMIC S	11 MONTH	LEFT HEMI	26	Full	9	11	32	40	33.8	32.8
SANATAN	MALE	48	63	5 FEET 5 IN	23.16	ISCHEMIC S	7 MONTHS	LEFT HEMI	28	Full	11	9	37	33	31.6	31.06
PRIYAMBAI	FEMALE	50	49	5 FEET 1 IN	20.67	ISCHEMIC S	7 MONTHS	RIGHT HEM	27	Full	8	8	35	43	35.6	34.06
SAUDAMIN	FEMALE	54	54	5 FEET 2 IN	21.95	ISCHEMIC S	7 MONTHS	RIGHT HEM	25	Full	9	11	39	40	28.8	26.06
ASHAMAN	FEMALE	45	61	5 FEET 2 IN	24.79	ISCHEMIC S	8 MONTHS	LEFT HEMI	26	Full	9	10	36	35	33.6	31.85
SUKANTI P	FEMALE	47	63	5 FEET 3 IN	24.61	ISCHEMIC S	7 MONTHS	RIGHT HEM	27	Full	10	10	34	34	29.6	27.85
JAYRAM BA	MALE	52	57	5 FEET 5 IN	20.95	ISCHEMIC S	10 MONTH	LEFT HEMI	29	Full	9	11	33	34	30.8	29.85
TRILOCHAN	MALE	51	64	5 FEET 6 IN	23.02	ISCHEMIC S	8 MONTHS	LEFT HEMI	25	Full	10	10	30	32	29.6	27.85
NILAKANH	MALE	53	66	5 FEET 6 IN	23.74	ISCHEMIC S	8 MONTHS	LEFT HEMI	27	Full	10		30	37	30.8	27

Group 2- Segmental m-CIMT



	NAME	GENDER	AGE	WEIGH	HEIGHT	BMI	CONDITION	ONSET	LEFT/ RIGHT HEMIPARES	MMSE	FULL / Seg	PRE_DGI	POST_DGI	PRE_BBS	POST_BBS	PRE_WGS	POST_WGS
1	MALE	45	74	6 FEET 1 IN	21.63	ISCHEMIC STROKE	9 MONTHS	RIGHT HEMIPARESIS	26	Segmental	9	14	36	39	35.6	32.6
2	MALE	55	65	5 FEET 7 IN	22.49	ISCHEMIC STROKE	11 MONTHS	RIGHT HEMIPARESIS	27	Segmental	8	13	33	42	33.6	29.8
3	MALE	57	67	5 FEET 3 IN	26.17	ISCHEMIC MCA ST	8 MONTHS	LEFT HEMIPARESIS	26	Segmental	9	12	39	39	33.6	30.6
4	FEMALE	51	58	5 FEET 5 IN	21.32	ISCHEMIC MCA ST	11 MONTHS	LEFT HEMIPARESIS	27	Segmental	10	14	32	39	30.8	26.8
5	FEMALE	42	57	5FEET 1 IN	24.05	ISCHEMIC MCA ST	9 MONTHS	LEFT HEMIPARESIS	25	Segmental	11	13	37	38	33.8	29.8
6	MALE	55	62	5 FEET 4 IN	23.66	ISCHEMIC STROKE	9 MONTHS	RIGHT HEMIPARESIS	26	Segmental	9	14	31	42	31.06	29.6
7	MALE	58	64	5 FEET 6 IN	23.02	ISCHEMIC STROKE	9 MONTHS	RIGHT HEMIPARESIS	26	Segmental	8	13	41	41	35.06	31.8
8	FEMALE	54	59	5 FEET 3 IN	23.04	ISCHEMIC STROKE	7 MONTHS	LEFT HEMIPARESIS	26	Segmental	10	15	37	43	28.8	24.6
9	MALE	45	64	5 FEET 2 IN	26.01	ISCHEMIC STROKE	6 MONTHS	RIGHT HEMIPARESIS	28	Segmental	9	14	34	43	33.06	29.8
10	MALE	55	68	5 FEET 4 IN	25.95	ISCHEMIC STROKE	10 MONTHS	LEFT HEMIPARESIS	27	Segmental	9	13	29	41	29.06	25.8
11	MALE	57	59	5 FEET 4 IN	22.51	ISCHEMIC STROKE	11 MONTHS	RIGHT HEMIPARESIS	28	Segmental	11	12	30	42	30.8	27.6
12	MALE	51	67	5 FEET 5 IN	24.63	ISCHEMIC STROKE	11 MONTHS	LEFT HEMIPARESIS	25	Segmental	8	14	28	38	29.05	26.6
13	MALE	56	69	5 FEET 8 IN	23.38	ISCHEMIC STROKE	9 MONTHS	RIGHT HEMIPARESIS	28	Segmental	10	12	34	37	29.05	26.6