EFFECTIVENESS OF WEIGHTED ANKLE CUFF IN IMPROVING BALANCE IN PERSONS WITH MULTIPLE SCLEROSIS

DISSERTATION

Submitted to

The Tamilnadu Dr. MGR Medical University

In partial fulfillment for the degree of

MASTER OF PHYSIOTHERAPY

(Advanced P.T. in Neurology Conditions)

Cherraan's College of Physiotherapy

Cherraan's Institute of Health Sciences

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APRIL- 2012

CERTIFICATE

The work embodied in the thesis entitled "**EFFECTIVENESS OF WEIGHTED ANKLE CUFF IN IMPROVING BALANCE IN PERSONS WITH MULTIPLE SCLEROSIS" submitted to the The Tamilnadu Dr. MGR Medical University, Chennai** in partial fulfillment for the degree of **MASTER OF PHYSIOTHERAPY (ADVANCED P.T IN NEUROLOGY CONDITIONS)**was carried out by candidate bearing register number **27103009** at Cherraan's College of Physiotherapy, Coimbatore under my supervision. This is an original work done by him and has not been submitted in part or full for any other degree/diploma at this or any other university/institute. The dissertation is fit to be considered for evaluation for award of the degree of Master of physiotherapy.

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Project work evaluated on _____

DECLARATION

The work embodied in the thesis entitled **"EFFECTIVENESS OF WEIGHTED ANKLE CUFF IN IMPROVING BALANCE IN PERSONS WITH MULTIPLE SCLEROSIS"** submitted to **The Tamilnadu Dr. MGR Medical University, Chennai**, in partial fulfillment for the degree of Master of Physiotherapy, was the original work carried out by me and has not been submitted in part or full for any other degree/diploma at this or any other university/institute. All the ideas and references have been duly acknowledged.

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Signature of student

Date: _____

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Mr.K.VINOTH

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ABSTRACT

OBJECTIVE

To evaluate the effect of weighted ankle cuff training programme on improving balance in persons with multiple sclerosis.

PARTICIPANTS

15 Subjects with multiple sclerosis – both sexes

METHODS

15 multiple sclerosis subjects were randomly assigned into experimental group that received ankle weighted cuff training with frequency of 5 times per week, with a total duration of 4 weeks. The outcome measure is Berg Balance Scale.

RESULT

After 4 weeks of weighted ankle cuff training, there was significant improvement in balance ($p<0.005$)

CONCLUSION

Weighted cuff training, would be effective in improving balance in multiple sclerosis

KEY WORDS

Multiple sclerosis, Berg balance scale, weighted ankle cuff.

INTRODUCTION

Multiple sclerosis is a degenerative disease of the central nervous system affecting myelin, Oligodendroids and axons[1]. Multiple sclerosis is the most common progressive neurologic disease in young adults[2]. And is usually diagnosed between the ages of 20-40 years. Compromised neural functioning leads to both sensory and motor dysfunction and thus contributes to problems with balance, co-ordination, postural control and walking mechanics. (Gait) [3, 4]

Impaired walking compromises functional ability in persons with neurologic deficits[5], such as multiple sclerosis, Parkinson's disease and stroke Chiou and Burnett[6], identified walking as the most important activity of daily livings and Hobart et al[7] reported that 75% of persons with multiple sclerosis experienced mobility problems. Debolt and Mc Cubbin[8] found that a resistance training programme was well tolerated by subjects with Multiple sclerosis and increase the lower extremity extensor muscle power.

The application of weight to the distal portion of a limb segment increases the overall mass of the limb and results in reduced motion. However, there is some evidence that limb motion is worse when the weight is removed.

Aim of the study

To assertain the effectiveness of weighted ankle cuff training in improving the balance in patients with multiple sclerosis

Need for the study

Most common problem faced by these multiple sclerosis patients is difficulty in walking (ambulation) due to poor balance, which makes the patients susceptible to falls causing injury, Though so many approaches have been used to improve balance in neuromuscular conditions, few studies have been done to decrease imbalance in multiple sclerosis patients. There are only a few literature evidences available for the documentation of effectiveness of improving balance by applying weights to ankle in multiple sclerosis patients. Hence the study is intended to find whether training with weights tied to the ankle can improve the balance in patients with multiple sclerosis.

Hypothesis

Null hypothesis

There will be no significant difference in balance after ankle weighted cuff training in multiple sclerosis patients.

Experimental hypothesis

There is a significant difference in balance after weighted ankle cuff training in multiple sclerosis patients.

REVIEW OF LITERATURE

The study was planned to investigate the efficacy of neuromuscular rehabilitation and Johnston pressure splint in patients who had ataxic multiple sclerosis patients. 26 out patients with multiple sclerosis subjects were included for this study, the control group (n=13) was given neuromuscular rehabilitation, were as the study group (n=13) was treated with Johnston pressure splints. The study concluded that the physiotherapy approaches were effective to decrease the ataxia and the combination of suitable physiotherapy techniques is effective in multiple sclerosis patients. **Armutlu et al**

A study to compare two physiotherapy approaches to improve walking in patients with gait disturbance due to multiple sclerosis. the subjects were randomly assigned to one of two groups using a block randomization technique they were treated by minimum of 15 physiotherapy treatments over a 5 to 7 weeks period and then reassessed by an independent therapist one week after treatment, so the study suggested an effectiveness of both a task oriented approach and a facilitation approach to the treatment of multiple sclerosis with improved mobility. **Lord SE et al.**

A study proved that weighted cuffs have been used successfully by three multiple sclerosis patients to decrease upper extremity tremors and thus facilitate independent fine co-ordination activity. This study was also used in brain injured patients to decrease tremors and increase proprioception. The author suggested that all these patients, working fasteners during dressing and eating were easier tasks when the cuffs were worn. **Dahlin- webb SR 1986.**

The study suggested that application of weight to the distal portion of a limb segment increase the overall mass of the limb and results in reduced motion. However, there is some evidence that limb motion is worse when the weight is removed. **Anne shumway et al.**

In a single case study design showed that treatment with picotesla electromagnetic fields is highly effective modality for the symptomatic management of chronic progressive multiple sclerosis in 36 year old man who had difficulties with balance with ataxia of gait. After receiving three treatment sessions a week over 12 months he experienced improvement in cerebellar functions such as gait, balance and tremor. Later there was no further progression of the disease during the bourse of magnetic therapy. The author suggested that treatment with electromagnetic fields, in addition to producing symptomatic improvement, also reverse the clinical course of chronic progressive multiple sclerosis. **Sandyk R, 1996**

A study examined gait abnormalities in 18 individuals with multiple sclerosis before and after 6 months exercise program designed for aerobic conditioning. Three dimensional kinematics, ground reaction forces (GRF) and electromyographic information was acquired as subjects walked at self selected velocities. It concluded that 6 months training program had minimal effect on ataxic gait abnormalities. **Rodgers MM et al, 1999**

The study examined the relationship of the berg balance scale to outcome after acquired brain injury. 40 patients were assessed with the berg balance scale. The berg balance scale was originally designed ass a quantitative measure of balance and risk for fall in the community dwelling elderly patients. The authors concluded that the prediction of rehabilitative outcome might be enhanced by the use of berg balance scale scores in combination with other clinical measures on admission to inpatient to acute rehabilitation. **Feld JA et al 2001**

The study in a randomized controlled study examine effectiveness of weighted garments on the balance and gait of stroke patients 24individualsWere given a set of weighted garments which they were shown how to apply and instructed to wear on their paretic side. Subjects randomly allocated to the 6 weeks control phase were not given weighted garments balance was measured by berg balance scale. The author found no evidence to support the clinical use of these weighted garments for stroke survivors. **Pomeroy V M et al, 2001**

A study to reliable and validates they berg balance scale use to assess characteristic of balance reported in 70 patients. Correlation between the scores of the dynamic gait index and the berg balance scale was moderated but significant by use of the spearman rank order correlation ($r=0.71$; $p<01$). No difference was found between scores on the dynamic gait index or berg balance scale based on gender or diagnosis. A significant difference was identified on the berg balance scale between older and younger people with vestibular disorder. The authors' concluded that the moderate correlation between the dynamic gait index and berg balance scale establishes the concurrent validity of the dynamic gait index with vestibular dysfunction. Both these measures proved valuable information to the clinician about patients functional balance capacities. **Whitney S et al 2003**

In a study validate they berg balance scale, for functional balance assessment, to Brazilian- Portuguese and to determine the reliability of scores obtained with the Brazilian adaptation. Reliability of the measure was assessed twice by one physical therapist (one-week interval between assessments) and once by one independent physical therapist. Descriptive analysis was used to characterize the patients. The interclass correlation co efficient (ICC)

and persons correlation coefficient were computed to assess intra-and inter observer reliability. 6 questions were modified during the translation stage cultural adaptation phase. The authors concluded that the Brazilian version of the berg balance scale is a reliable instrument to be used in balance assessment of elderly Brazilian patients. **Miayamoto ST et al 2004**

The study examined the balance, dynamic gait and dynamic visual acuity outcomes after a vestibular and balance rehabilitation program and to determine which variables were significantly associated with improve balance and ambulation. 20 patients underwent intervention which includes gaze stabilization, balance and gait training and habituation exercises which were assessed on the bases of the dynamic gait index, berg balance scale, dynamic visual acuity test and computerised posturography (sensory organization test). The scores showed significant improvement and concluded that patients showed functional improvement in balance, visual acuity and gait stability after balance and vestibular physical therapy. Age and pre therapy vertical dynamic visual acuity score influenced dynamic gait outcome after a balance rehabilitation program. **Badke MB et al 2004**

In this study effects of lower body resistance training program on walking mechanics in patients with multiple sclerosis for 8 weeks of treatment program based on disability status scale scores. After 2 months of resistance training there was significantly increase in percentage of stride time in swing phase, step length, stride length, foot ankle and significant decrease in percentage of stride time in stance and double support phase and toe clearance, concluded that resistance training may be effective intervention strategy for improving walking and functional ability in moderately disabled persons with multiple sclerosis. **Gutierrez GM et al 2005**

A study on Balance in personal care home residents. This study includes Berg balance scale, the multi- Directional reach test (MDRT), and the activities specific balance confidence scale (ABC) to quantify balance. The reliability and construct validity of these measures were also explained. Reliability was quantified using interclass correlation co efficient (ICC). Construct validity was quantified using pearsons correlation co efficient and Cranach's alpha. The balance tests showed moderate to good reliability. The BBS appeared to be valid measures of motor ability to maintain balance. **Holbein – jenny MA et al 2005**

The study investigated whether 4 weeks of aerobic treadmill training in multiple sclerosis patients improved mobility and reduced fatigue. Individuals were assessed at base line, week 7and 12 with a 10 meter walk, a 2 minute walk, the river mead mobility index and fatigue severity scale. There was significant difference in walking endurance. The investigator suggests that walking speed and endurance increased following training with no increase in reported fatigue. Detraining occurred in the period following training. A larger randomized clinical trial is warranted. **Van den Berg M et al 2006**

In this case report is to investigate the use of neurocom balance master^{TM} training protocols as an intervention for patients with multiple sclerosis presenting with decreased balance, transverse ambulation. A 30 year old man with an acute exacerbation of relapsing remitting multiple sclerosis presented with impaired strength, balance, transverse and gait. The patient demonstrated improvements in dynamic sitting balance, static and dynamic standing balance, transverse gait and functional performance. So, they concluded that the Neurocom balance master ^{TM} training protocols a variety of task goals that require propulsive

movements of the body's COG, narrowed base of support and high velocity movement on unstable surface. **Jordan Larsen- Merrill et al**

In this study to compare interrater and test- retest reliability of the BBS, the dynamic gait index, the dizziness handicap inventory and the activities- specific balance confidence, there are 25 persons were enrolled for this study, the onset of pathology was 8.7 years before the beginning of the study. To assess the test-retest reliability to consecutive assessment were collected by the same rater. To assess the inter rater reliability persons were concurrently assessed by 2 raters. So, they were concluded that the inter rater reliability of the instrument proved to be satisfactory. Lower but acceptable results were obtained for the test –retest paradigm. The data obtained in this study suggest that these scales are reliable tools for assessing balance function in persons suffering from multiple sclerosis. **Davide Cattaneo et al 2006**

In this study was to investigate the inter rater reliability and the internal consistency of the Iranian version of the BBS when applied to patients with multiple sclerosis in Tehran. There are 50 multiple sclerosis patients from hospitals of the Iran University of Medical Science and multiple sclerosis society of Iran was included. So they concluded that the Iranian version of the BBS has excellent inter rater reliability and internal consistency for the assessment of multiple sclerosis patients when applied in clinics **Akram Azad et al 2009**

This study was to determine the test-retest reliability of 2 measurement tools used to examine balance in persons with brain injury.5 participants (ages 20-32)were recruited from a transitional living facility in Galveston,Texas. Each participants performed the BBS and Balance master limits of stability test (BMLOST) sequence in random order on the same day 1 week latter. So they concluded that the preliminary test –retest reliability for both the BBS

and aspects of the BMLOST for persons with brain injury was demonstrated. The value of administering the tests in isolation or combination for patients with brain injury is yet to be determined.**Newstead AH,et al 2005**

A study is to describe how patients with multiple sclerosis increased the isokinetic peak torque of their knee flexors and perceived well- being after an endurance training program. There are 5 patients trained for 4-6 weeks using an endurance program for the lower extremities. Before and after training, the subjects performed 50 repeated maximum knee flexion with simultaneous recording of surface electromyography activity of to knee flexors, on 3 separate days using an isokinetic dynamometer. Throughout the tests, the subjects rated their perception of peripheral muscle fatigue. VAS was used to rate difference aspects of well being. So, they concluded that more comprehensive studies of exercise prescription in patients with multiple sclerosis are desirable. **Britta Svensson et al**

A study was to test concurrent and discriminate validity of several tests of static and dynamic balance in a sample of subjects suffering from MS. A group of 51 patients were enrolled in the study. The following tests were administered: Berg Balance Scale (BBS), Timed Up and Go Test (TUG), Dynamic Gait Index (DGI), Hauser Deambulation Index (DI), Dizziness Handicap Inventory (DHI), and Activities-specific Balance Confidence (ABC). The scales used in this study were initially translated into Italian. They concluded that the BBS, TUG, DI, DGI, ABC, DHI have acceptable concurrent validity. The scales have poor performance in discriminating between faller and non-faller. **Davide cattaneo et al 2005**

MATERIALS & METHODOLOGY

Study design

Experimental study involving pre test and post test measures.

Source of data

Neurology department, medical college hospital, Coimbatore.

Sampling method

Samples are selected on simple random sampling.

Sample size: 15

Inclusion criteria

- Clinically definite or laboratory supported Multiple sclerosis patients aged 18 - 65 years.
- Stable disease for previous 6 months in the opinion of the treating physician.
- Patients must be ambulatory.
- Able and willing to sign an informed consent form

Exclusion criteria

- Past history of ischemic heart disease or psychotic illness
- Other serious illness likely to interfere with study assessment such as major organ failure, neoplasia, coeliac disease
- Open / infected pressure sores or other source of chronic infection
- Severe cognitive impairment such that patient is unable to provide informed consent
- Women who are pregnant, lactating.
- Any illness which might affect a patient's survival over the follow-up period
- Cerebrovascular accident within 6 months prior to study entry

Materials

- Examination table
- Physical evaluation Performa
- Berg Balance Scale
- Weight cuff
- Chalk / marker

Procedure

The consent form from the patients was obtained and patients diagnosed with multiple sclerosis were included in the study.

Pre test

The patients balance was evaluated by Berg Balance scale.

Intervention

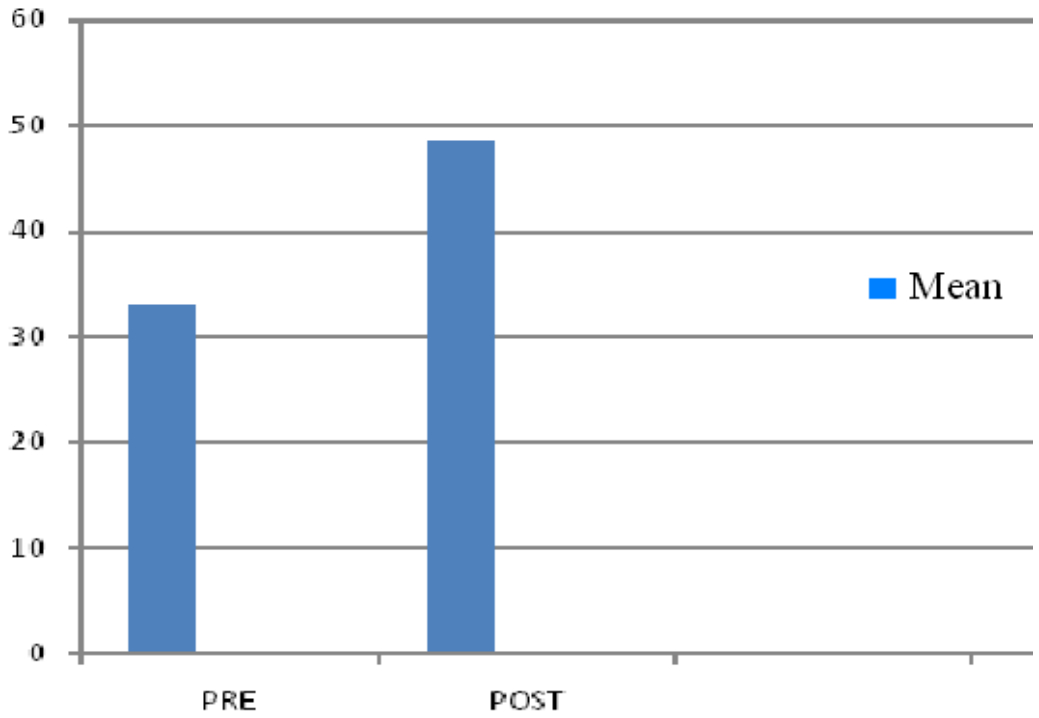
All these patients were given training by applying half (1/2 kg)weight cuffs to both ankles. Initially patients needed assistance by the therapist, the gait training was started by weight shifting sideways and the support. The patient was also given unilateral stance. Later the patients were assessed to walk on a line; gradually the assistance was taken off by therapist.

The gait training was given for total duration of 4 weeks with frequency of 5 times per week and the treatment session lasted for 30 minutes duration

Post test

At the end of 4^{th} week balance was reassessed by using Berg Balance Scale.

DATA PRESENTATION



Graph 1: Showing the Mean difference in pre and post test in Berg Balance Scale in patients with Multiple Sclerosis.

DATA ANALYSIS

In this study, the Pre-test and Post-test were compared for the significant difference to infer the effectiveness of weighted ankle cuff in improving balance in persons with multiple sclerosis. The statistical tool used in this analysis was independent 't' test. The difference of values between pretest and post test were found. It was done for the values taken before and at the end of four weeks respectively.

Table: 1 comparison of pre and post treatment scores of Berg Balance Scale

Treatment	**Mean +SD**	**Paired t value**	**Significance**
Pre- test	32.87 + 4.14	24.453	P< 0.005
Post - test	48.60+ 4.86		

Result

The t- value is found to be 24.453 and hence it is significant at 0.005 levels. Therefore the stated alternate hypothesis is accepted and null hypothesis is rejected. So it is concluded that there is a significant difference between pre and post test in multiple sclerosis patients.

Discussion

The participants involved in this study were individuals with multiple sclerosis who can get benefited from balance training. Therefore, they were representative of the entire multiple sclerosis patients.

The features of multiple sclerosis will be associated with primary impairment of balance. So, in this study the balance was found to be increased in this group of patients. There are 15 subjects were participated for this study. After 4 weeks of training with weight cuff, the balance was showed statistically significant difference with $p< 0.005$.

In the present study the total duration of the training was limited to 4 weeks only. Long term training might have given more significant results. Statistically it was found that there was significant improvement in balance ($p<0.005$) with multiple sclerosis patients.

Limitations for this study

- In this study other parameters of gait like step length, step width, speed, degree of toe out, etc. were not taken as outcome measures.
- Whether the beneficial effects obtained after training will be sustained or not, is not known.
- The study sample size was small
- Prognosis of the condition also dependents on the cause of multiple sclerosis. But in this study the cause for multiple sclerosis was not considered.

Recommendations for future studies

- The various age groups to be considered with different weight cuff along with large sample size.
- Studies should be done with control group
- Long duration studies to be done
- Home program and modifications can be taken into considerations.

Conclusion

From the results of the present study, it can be concluded that, the weighted cuff training is effective in improving balance in multiple sclerosis patients.

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APPENDIX – I

CONSENT FORM

I have been informed about the procedures and the purpose of the study. I have understood that I have the right to refuse my consent or withdraw it any time during the study without adversely affecting my treatment. I am aware that being subjected to this study I will have to give my more time for assessments and treatment and these assessments do not interfere with the benefits.

I, _____, the under signed, give my consent to be a Participant of this investigations/study program/clinical trial.

Signature of the investigator

Date:

Signature of subject

(Name and address)

APPENDIX –II

PROFORMA

DEMOGRAPHIC DATA

Name :

Age :

Sex :

Address :

Duration of disorder :

Date of examination :

BERG BALANCE SCALE ANALYSIS

PRE AND POST TEST TABLE

S.NO		PRE-TEST	POST-TEST
1	Balance score		

SIGNATURE OF THE THERAPIST

APPENDIX – III

Berg Balance Scale

The Berg Balance Scale (BBS) was developed to measure balance among older people with impairment in balance function by assessing the performance of functional tasks. It is a valid instrument used for evaluation of the effectiveness of interventions and for quantitative descriptions of function in clinical practice and research. The BBS has been evaluated in several reliability studies. A recent study of the BBS, which was completed in Finland, indicates that a change of eight (8) BBS points is required to reveal a genuine change in function between two assessments among older people who are dependent in ADL and living in residential care facilities.

Description:

14-item scale designed to measure balance of the older adult in a clinical setting.

Equipment needed: Ruler, two standard chairs (one with arm rests, one without),

Footstool or step, stopwatch or wristwatch, 15 ft walkway

Completion:

Time: 15-20 minutes

Scoring: A five-point scale, ranging from 0-4. “0” indicates the lowest level of function and “4” the highest level of function. Total Score = 56

Interpretation: 41-56 = low fall risk

21-40 = medium fall risk

0 –20 = high fall risk

A change of 8 points is required to reveal a genuine change in function between 2 assessments.

Berg Balance Scale

Name: _____ Date: _____

Location: _____ Rater: _____

ITEM DESCRIPTION SCORE (0-4)

Sitting to standing _____

Standing unsupported _____

Sitting unsupported _____

Standing to sitting _____

Transfers _____

Standing with eyes closed _____

Standing with feet together _____

Reaching forward with outstretched arm _____

Retrieving object from floor _____

Turning to look behind _____

Turning 360 degrees _____

Placing alternate foot on stool _____

Standing with one foot in front _____

Standing on one foot _____

Total _____

GENERAL INSTRUCTIONS

Please document each task and/or give instructions as written. When scoring, please record the lowest response category that applies for each item.

In most items, the subject is asked to maintain a given position for a specific time. Progressively more points are deducted if:

• The time or distance requirements are not met

• The subject's performance warrants supervision

• The subject touches an external support or receives assistance from the examiner

Subject should understand that they must maintain their balance while attempting the tasks. The choices of which leg to stand on or how far to reach are left to the subject. Poor judgment will adversely influence the performance and the scoring.

Equipment required for testing is a stopwatch or watch with a second hand, and a ruler or other indicator of 2, 5, and 10 inches. Chairs used during testing should be a reasonable height. Either a step or a stool of average step height may be used for item # 12.

Berg Balance Scale

SITTING TO STANDING

INSTRUCTIONS: Please stand up. Try not to use your hand for support.

( ) 4 able to stand without using hands and stabilize independently

( ) 3 able to stand independently using hands

( ) 2 able to stand using hands after several tries

( ) 1 needs minimal aid to stand or stabilize

( ) 0 needs moderate or maximal assist to stand

STANDING UNSUPPORTED

INSTRUCTIONS: Please stand for two minutes without holding on.

( ) 4 able to stand safely for 2 minutes

( ) 3 able to stand 2 minutes with supervision

( ) 2 able to stand 30 seconds unsupported

( ) 1 needs several tries to stand 30 seconds unsupported

( ) 0 unable to stand 30 seconds unsupported

If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported.

Proceed to item #4.

SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL

INSTRUCTIONS: Please sit with arms folded for 2 minutes.

( ) 4 able to sit safely and securely for 2 minutes

( ) 3 able to sit 2 minutes under supervision

( ) 2 able to able to sit 30 seconds

( ) 1 able to sit 10 seconds

( ) 0 unable to sit without support 10 seconds

STANDING TO SITTING

INSTRUCTIONS: Please sit down.

( ) 4 sits safely with minimal use of hands

( ) 3 controls descent by using hands

( ) 2 uses back of legs against chair to control descent

( ) 1 sits independently but has uncontrolled descent

( ) 0 needs assist to sit

TRANSFERS

INSTRUCTIONS: Arrange chair(s) for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

( ) 4 able to transfer safely with minor use of hands

( ) 3 able to transfer safely definite need of hands

( ) 2 able to transfer with verbal cuing and/or supervision

( ) 1 needs one person to assist

( ) 0 needs two people to assist or supervise to be safe

STANDING UNSUPPORTED WITH EYES CLOSED

INSTRUCTIONS: Please close your eyes and stand still for 10 seconds.

( ) 4 able to stand 10 seconds safely

( ) 3 able to stand 10 seconds with supervision

( ) 2 able to stand 3 seconds

( ) 1 unable to keep eyes closed 3 seconds but stays safely

( ) 0 needs help to keep from falling

STANDING UNSUPPORTED WITH FEET TOGETHER

INSTRUCTIONS: Place your feet together and stand without holding on.

( ) 4 able to place feet together independently and stand 1 minute safely

( ) 3 able to place feet together independently and stand 1 minute with supervision

( ) 2 able to place feet together independently but unable to hold for 30 seconds

( ) 1 needs help to attain position but able to stand 15 seconds feet together

( ) 0 needs help to attain position and unable to hold for 15 seconds

REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING

INSTRUCTIONS: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at the end of fingertips when arm is at 90 degrees. Fingers should not touch the ruler while reaching forward. The recorded measure is the distance forward that the fingers reach while the subject is in the most forward lean position. When possible, ask subject to use both arms when reaching to avoid rotation of the trunk.)

( ) 4 can reach forward confidently 25 cm (10 inches)

( ) 3 can reach forward 12 cm (5 inches)

( ) 2 can reach forward 5 cm (2 inches)

( ) 1 reaches forward but needs supervision

( ) 0 loses balance while trying/requires external support

PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION

INSTRUCTIONS: Pick up the shoe/slipper, which is in front of your feet.

( ) 4 able to pick up slipper safely and easily

( ) 3 able to pick up slipper but needs supervision

( ) 2 unable to pick up but reaches 2-5 cm(1-2 inches) from slipper and keeps balance independently

( ) 1 unable to pick up and needs supervision while trying

( ) 0 unable to try/needs assist to keep from losing balance or falling

TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING

INSTRUCTIONS: Turn to look directly behind you over toward the left shoulder. Repeat to the right. (Examiner may pick an object to look at directly behind the subject to encourage a better twist turn.)

( ) 4 looks behind from both sides and weight shifts well

( ) 3 looks behind one side only other side shows less weight shift

( ) 2 turns sideways only but maintains balance

( ) 1 needs supervision when turning

( ) 0 needs assist to keep from losing balance or falling

TURN 360 DEGREES

INSTRUCTIONS: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

( ) 4 able to turn 360 degrees safely in 4 seconds or less

( ) 3 able to turn 360 degrees safely one side only 4 seconds or less

( ) 2 able to turn 360 degrees safely but slowly

( ) 1 needs close supervision or verbal cuing

( ) 0 needs assistance while turning

PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED

INSTRUCTIONS: Place each foot alternately on the step/stool. Continue until each foot has touched the step/stool four times.

( ) 4 able to stand independently and safely and complete 8 steps in 20 seconds

( ) 3 able to stand independently and complete 8 steps in > 20 seconds

( ) 2 able to complete 4 steps without aid with supervision

( ) 1 able to complete > 2 steps needs minimal assist

( ) 0 needs assistance to keep from falling/unable to try

STANDING UNSUPPORTED ONE FOOT IN FRONT

INSTRUCTIONS: (DEMONSTRATE TO SUBJECT: Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot. (To score 3 points, the length of the step should exceed the length of the other foot and the width of the stance should approximate the subject's normal stride width.)

( ) 4 able to place foot tandem independently and hold 30 seconds

( ) 3 able to place foot ahead independently and hold 30 seconds

( ) 2 able to take small step independently and hold 30 seconds

( ) 1 needs help to step but can hold 15 seconds

( ) 0 loses balance while stepping or standing

STANDING ON ONE LEG

INSTRUCTIONS: Stand on one leg as long as you can without holding on.

( ) 4 able to lift leg independently and hold > 10 seconds

( ) 3 able to lift leg independently and hold 5-10 seconds

( ) 2 able to lift leg independently and hold L 3 seconds

( ) 1 tries to lift leg unable to hold 3 seconds but remains standing independently.

( ) 0 unable to try of needs assist to prevent fall

( ) **TOTAL SCORE (Maximum = 56)**

APPENDIX – IV

BERG BALANCE SCALE SCORES

Sl.no	NAME	AGE	SEX	PRE-TEST	POST-TEST
1	KANNAN	46	MALE	29	40
2	SURESH	50	MALE	38	50
3	LAVANYA	38	FEMALE	39	55
4	NIRMAL	39	MALE	30	43
5	NITHYA	40	FEMALE	33	50
6	KANCHANA	44	FEMALE	31	45
7	SAKTHIVEL	58	MALE	28	43
8	RAMAMOORTHY	56	MALE	37	53
9	NOOR JAHAN	47	FEMALE	35	50
10	PRABAGARAN	39	MALE	30	49
11	PASUPATHY	50	MALE	38	54
12	LAKSHMI DEVI	46	FEMALE	28	47
13	SARALA	57	FEMALE	36	55
14	RAMANAN	45	MALE	34	52
15	VISHWANATHAN	43	MALE	27	43