Efficacy of specific step up exercise with conventional physical therapy versus conventional physiotherapy alone on gait parameters in stroke

DISSERTATION

Submitted for the partial fulfillment of the requirement for the degree
of

MASTER OF PHYSIOTHERAPY (MPT)

(Elective - MPT NEUROLOGY**)**

Done by

M.SUGAN

Bearing Registration No: 271520265

Submitted to:

THE TAMILNADU DR. M.G.R MEDICALUNIVERSITY CHENNAI–

600032.

OCTOBER - 2017

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MOHAMED SATHAK A.J COLLEGE OF PHYSIOTHERAPY
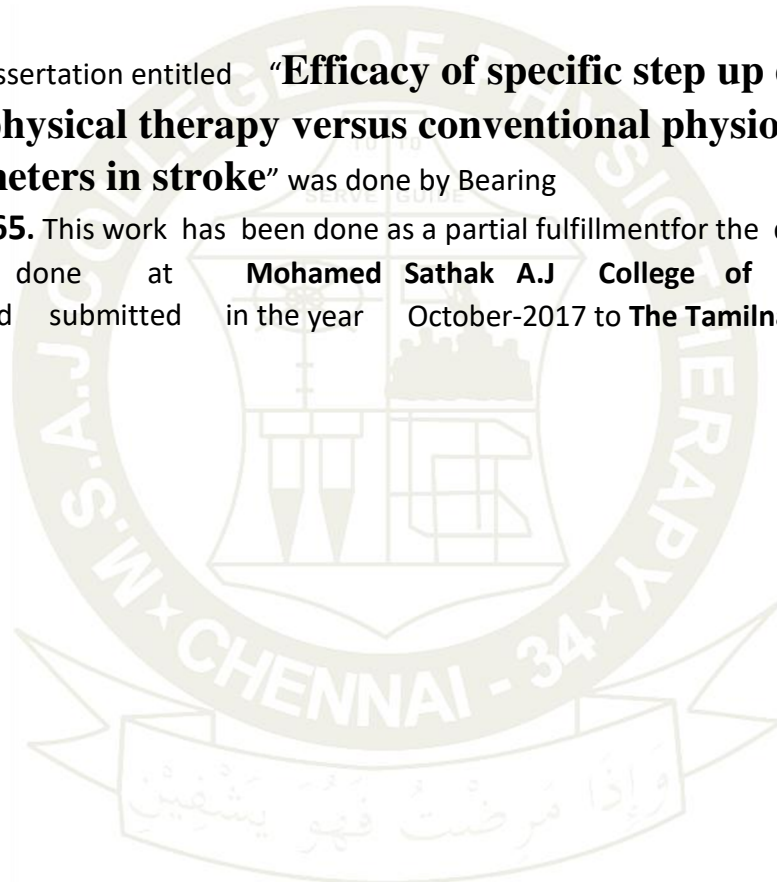
Nungambakkam, Chennai–600034.

OCTOBER- 2017

This is to certify that the Dissertation entitled "**Efficacy of specific step up exercise with conventional physical therapy versus conventional physiotherapy alone on gait parameters in stroke**" was done by Bearing Registration.No:**271520265.** This work has been done as a partial fulfillmentfor the degree of **Master of Physiotherapy** done at **Mohamed Sathak A.J College of Physiotherapy**, Chennai and submitted in the year October-2017 to **The Tamilnadu Dr. M.G.R Medical University**.

Date:

Place: Chennai

Seal & Signature of Principal

……………………………………………

Prof. R.RADHAKRISHNAN, MPT. PGDHM.

This is to certify that the Dissertation entitled "**Efficacy of specific step up exercise with conventional physicaltherapyversus conventional physiotherapy alone on gait parameters in stroke**"was done by Bearing Registration No:**271520265.**This work has beenone under my direct guidance and supervision for the partial fulfillment   of   the requirement of **Master of Physiotherapy** degree at **Mohamed Sathak A.J college of Physiotherapy**, Chennai, and submitted during the year October-2017 to **The Tamilnadu Dr.M.G.R Medical University.**

Date:

Place: Chennai

Signature of Guide

…..……………………………..

PROF R. RADHAKRISHNAN MPT,PGDHM

Mohamed Sathak A.J College of Physiotherapy

CERTIFICATE

MOHAMED SATHAK A.J COLLEGE OF PHYSIOTHERAPY

Nungambakkam,Chennai–600034.

This is to certify that Dissertation entitled **Efficacy of specific step up exercise with conventional physical therapy versus conventional physiotherapy alone on gait parameters in stroke"**

was done by Bearing Registration. No:**271520265.** The under signed examiners has duly verifiedand examined the submitted Dissertation done by the above candidate.

....

Internal Examiner   External Examiner

Place:

Date:

DECLARATION BY THE CANDIDATE

I hereby declare that the Dissertation entitled **Efficacy of specific step up exercise with conventional physical therapy versus conventional physiotherapy alone on gait parameters in stroke**" was done by me for the partial fulfilment of the requirement of **Master of Physiotherapy** degree. The dissertation had been done under the direct supervision and guidance of my Guide at **Mohamed Sathak A.J college of Physiotherapy** , Chennai, and submitted the same during the year October-2017 to **The Tamilnadu Dr.M.G.RMedical University**.

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Place : Chennai

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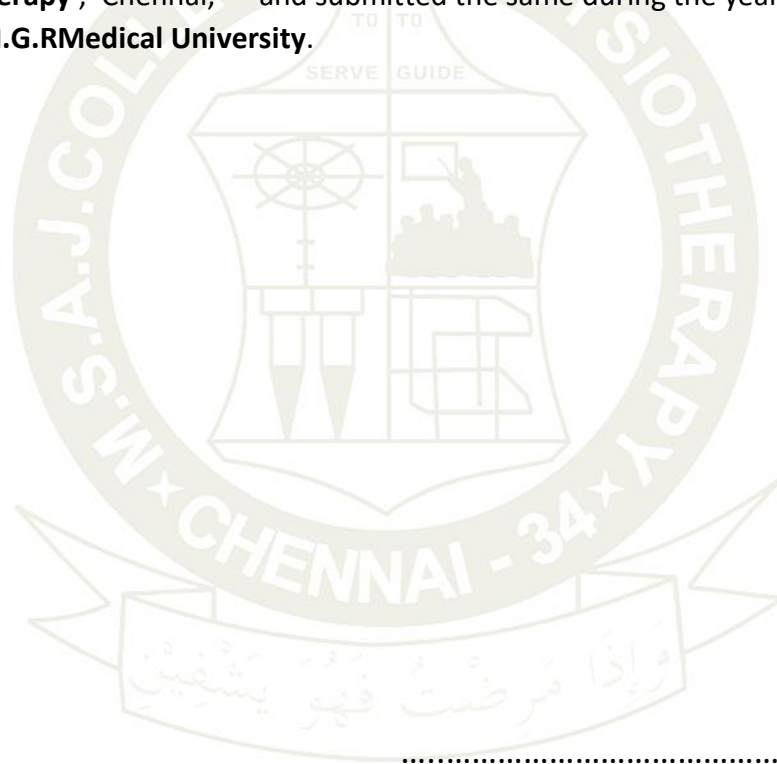
Signature of the Candidate

ACKNOWLEDGEMENT

I thank **ALMIGHTY** for blessing me in all aspects to complete my dissertation successfully.

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My sincere thanks to our respectable Correspondent **Alhaj E.S.M.A Basheer Ahmed and Janab Mohammed Ashrath,** Mohamed Sathak College of physiotherapy, Chennai.

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I take privilege to thank my college librarian for providing me with necessary books needed for my dissertation work.

I extend my thanks to my family and all who motivated and helped me in all aspects to complete the study.

TABLE OF CONTENTS

INTRODUCTION

INTRODUCTION

Stroke is a medical emergency and can cause permanent neurological damage leads to disability. Hypertension is an important risk factor of stroke. Stroke represent 12 per cent of total death in India. Stroke ambulation is an important determination for community of living and functional independence.

The loss of abilities of independent walking is one of the most common consequences of stroke, as a result of alteration demonstrated by hemiparetic individuals, disabilities were shown which affect their activities of daily living and walking. The residual motor weakness, abnormal synergic movements, and the spasticity result in an altered gait standard and contribute for a weak balance, risk of falls and increased energy consumption while walking.

Reduced speed, poor coordination movements, shorter steps, longer support time and shorter swing phase on the affected side are the futures affected in chronic hemiparetic individuals.

Individuals with continue have deficit in symmetrical stance and weight shifting disabilities despite improvement in more selectivity of paretic limb imbalance and walking skills. It has been contended that weight asymmetry and impaired balance function may be a consequence of disuse of the paretic limb.

In addition decreased gait speed asymmetric gait pattern, are commonly observed in individual. Gait asymmetry are often characterized decreased duration of single leg stance on the impaired limb, difference in step length of the unimpaired limb (**HSU A,TANG P 2003**). These abnormalities arise a result of impairment, inflexibility, strength, coordination, balance all of these compromised in stroke patients.

Stroke rehabilitation is progressive dynamic, goal oriented process aimed at enabling person with on impairment to reach the optimal physical, emotion, communication, and social functional level – (**Heart and stroke foundation**).

Conventional rehabilitation program includes regular passive movements, stretching, range of motion exercises, balance and gait training helps to maintain the flexibility and decreased muscle, weight bear standing with support such a using standing frame or other supportive device also helps to stretch muscle.

Gait recovery requires different techniques which demands physical therapist ability to help, patients bears own body weights and control the balance. In several patients with stroke asymmetric gait patterns with a difficult interventions during conventional training causing an unsatisfactory rehabilitation.

Step up exercises are the activities included with number of other task oriented training to improve performance of walking in stroke patients.

Step exercises is a mean of weight bearing exercise to increase lower limb muscle neuromuscular coordination, weight bearing of affected lower limb extremity is on effective strategies improve balance and locomotion, raising a foot on step appears to be on appropriate for weight shift training of stroke patients.

As the forward displacement of leading limb during ambulation is dependent upon weight transfer to the trailing limb, which is usually compromised in stroke patients due to the effect of disuse learning, placing the foot on a high step may be an appropriate strategy to improve gait parameters.

It is an established fact that exercise is means of step up exercises is the mean of weight bearing exercise to increase lower limb muscle neuromuscular coordination **[ENGJ (PHYSIOTHERAPY CAN,2004)]** This study attempts to find out the efficacy of specific step up exercises with conventional physical therapy on the improvement of gait parameters of stroke patients.

STATEMENT OF STUDY

Efficacy of specific step up exercises with conventional physical therapy versus conventional physical therapy alone on gait parameters in stroke.

AIM OF STATEMENT

To find the effectiveness of specific step up exercise on improving gait parameters in stroke patients.

NEED OF THE STUDY

The loss of the ability of independence walking in one of the most common consequence of stroke, when beginning of bipedalism exchanging step, the movement performed by patients keep different hemiparetic adult gait as compared to normal. Gait recovery requires different technique that helps the patients to bear own body weights and control balance. It is known that step up exercise will improve lower limb neuromuscular coordination that helps to improve the gait parameters of stroke patients.

OBJECTIVES

1. To find out the effectiveness specific step up exercises on improving gait parameters on stroke subjects.

2. To find out the effectiveness of conventional physical therapy on improving gait parameters in stroke subjects.

3. To compare the effectiveness of both on improving gait parameters in stroke subjects.

OPERATIONAL DEFINITIONS

STROKE

WORLD HEALTH ORGANISATION, Stroke is defined as a rapidly developed clinical sign of a focal disturbance of cerebral function of presumed vascular origin and of more than 24 hours duration.

BALANCE

Balance in grounds of biomechanics, is defined as an ability to maintain the line of gravity (vertical line from centre of the mass) of the body within the base of support with minimal postural sway. Maintaining balance requires coordination of input from multiple sensory systems including the vestibular, somato sensory and visual systems.

GAIT

Gait is defined as the bipedal, biphasic forward propulsion of centre of gravity of human body, in which there are alternate sinuous movements of different segments of the body with least expenditure energy. Different gait are characterized by difference in limb movement patterns, over all velocity, forces, kinetic and potential energy cycles and changes in the contact with the surface (ground, floor, etc.)

HYPOTHESIS

ALTERNATE HYPOTHESIS It is the hypothesis that specifies step up exercise with conventional physical therapy is most effective than conventional physical therapy alone on improving gait parameters in stroke subjects.

NULL HYPOTHESIS it is the hypothesis that specific step up exercise with conventional physical therapy is not effective on improving gait parameters than conventional physical therapy alone improving gait parameters in stroke subject.

REVIEW OF LITERATURE

1. **WORLD HEALTH ORGANISATION**

Stroke is defined as a rapidly developed clinical sign of a focal disturbances of cerebral function of presumed vascular origin and of more than 24 hours duration.

2. **WADE DT, WOOD V A etl (2003)**

Stated that the loss of abilities of independent walking one of the most common consequence of as a result of alteration demonstrated by hemiparetic individuals, disabilities were shown which affect their activities of daily living and walking.

3. **ALEXANDE S.ARUIN ETL (2000)**

   Stated that following a stroke a person with hemiparesis may be enable or reluctant to bear much weight through the paretic limb when significant paresis exists, later, continued weight bearing asymmetry may continue and foster a further disuse despite the probability that improved motor function in the lower limb has occurred.

4. **WADE DT,WOOD VE HELLER A (1987)**

   Stated that when beginning the bipedalism and exchanging steps the movements performed by the patients with stroke keep a different hemiparetic standard from adult gait considered normal.

5. **HESSE S,JAHNKE MT ,SCHAFFRIN A, LUCKE D (1998)**

   Stated that the gait features reduced speed and poorly coordinated movements, shorter steps, longer support time and short swing phase on the side affected. The residual motor weakness, abnormal synergetic movements and the spasticity result in an altered gait standard and contribute for a weak balance, risk of falls and increased energy consumption while walking.

6. **M C MAYBURY, J WATERFIELD ETL (2000)**

   In his experiment studied the compelled weight bearing of affected lower extremity is an effective strategy to improve balance and locomotion.

7. **LAUFER Y, DICKSTEIN R, RESNIJ S, MARCOVITZ E.(2000)**

   Concluded that hence a foot on a step appears to be an appropriate strategy for weight shift training of stroke patients. Since weight shifting to both the

paralytic and non-paralytic limb of stroke patients is impaired, treatment strategies should include training in weight shifting to both lower extremities.

8. MAUREEN K HOLDEN, KATHLEEN MGILL, MARIER MAGLIOZZI, JOHN NATHAN AND LINDA- BAKER (2007)

Stated that the baseline data measured using the ink foot-print record method before commencement of therapy by measuring the gait parameters on a 10 meter walkway with a plain sheet of paper on its surface. Inter-rater reliability of this outcome measure is high as well as the significant relationship of velocity, cadence, step length and SL: LEL to functional ambulation supports the validity of their use as an outcome measures.

9. HIROSHIGE TA TEUCHI, TOCSHIKO YONEDA (2006)

In his study the step up exercise intervention additionally reinforced balance, strength and loading of the affected as well as unaffected limb, which could explain the findings of the experimental group.

10. HYUK CHEOL. KWON ET AL (2010)

Studied the characteristics of lower extremity weight bearing in independently ambulatory hemiparetic patients stand on the flat ground, basically the weight bearing removes to the sound lower extremity, the weight bearing other than that on the stool is loaded more, and the higher the stool i.e 6(15cm) stepped by a foot is, the more weight bearing of any lower extremity on the ground happens. It was further supported by the Richard W Bohannon and Patricia A Larkin16 and Laufer et al.

11. HIROSHIGE TATEUCHI,TOSHIHIKO YONEDA (2006)

The lateral step up exercises were found to improve the loading response by influencing the shifting of COG through the enforced recruitment of gluteus medius activity of the supporting leg and adductor longus of stepping leg.

12. CHITRALAKSHMI K (2007)

It was found that to have symmetrical and significant increase in step lengths and gait velocity one needs to generate greater propulsive forces with both the legs.

13. YANG YR ET AL (2005)

Examined the effective of additional backward walking on gait outcomes including walking speed, cadence, gait cycle and symmetry in stroke patients and observed significant improvement in selected gait parameters ,the results of this study also support improvement in cadence and gait velocity.

14. KIRKER ET AL (2000)

Have shown that hip abductor activity post stroke is primarily disrupted while initiating movement (e.g taking a first step) and when responding to external perturbations. These abilities are important for independent walking at home and in the community.

15. SIMSAND BRUCER ET AL AND VICKI STEMMONS MERCER ETAT (1997)

Stated that step up exercises was found to be beneficial in accomplishing the task of challenging the lateral stability and maximum recruitment of hip abductors.

16. YUKARI MORI ET AL (2007)

Study in which effects of a 12 week home based step exercise programme on aerobic capacity, lower extremity power and static balance in elderly subjects were seen and it was concluded that there was a significant improvement of all the three.

17. WADE ET AL (2009)

Step up exercise group improved significantly both in stride length and cadence, which would have resulted in the increase of walking speed, which is usually the aim to improve the functional significance.

DESIGN AND METHODOLOGY

DESIGN AND METHODOLOGY

STUDY DESIGN:

      Experimental study.

STUDY SET UP:

      First rehabilitation centre, anna nagar.

      Mercury Hospital, Egmore.

SAMPLING CRITERIA

INCLUSION CRITERIA:

- Both male and female.
- Ischemic stroke involving middle Cerebral Artery Territory.
- Age 40-60 years symptoms more than 3-4 months.
- Subjects with able to walk 10 meters independently without an assistive device.
- Subjects above stage 3 of Brunnstrom's stages in affected lower limb.
- Subjects oriented and ability to communicate independently.
- Subjects with ability to step up 6" high step stool in forward, backward and lateral directions independently or either with manual guidance.

EXCLUSION CRITERIA

- Subjects with cognitive or perceptual disorders.
- Subjects sensory impairments involving lower limbs.
- Subjects with orthopaedic or rheumatologic conditions interfering with gait.
- Subjects with cardiovascular disorders.
- Subjects with auditory and severe visual impairment.

POPULATION

- All stroke subjects who fulfil inclusion criteria were included in the study.

SAMPLE SIZE

- 30 Subjects were selected from population using convenient sampling procedure and they were allocated into two groups.
- Experimental study (15 subjects) specific step up exercise with conventional physical therapy.
- Control group (15 subjects) conventional physical therapy

VARIBLES

INDEPENDENT VARIABLES

- Specific step up exercise programme.
- Conventional physical therapy.

DEPENDENT VARIABLES

- Step length
- Stride length

STEP LENGTH

Step length is the distance covered in an average step, either from heel to heel or toe to toe.

STRIDE LENGHT

Stride length is measured from heel to heel and determines how far you walk with each step.

CADENCE

Cadence is the rate at which a person walk, expressed in steps per minute

DURATION OF THE STUDY

- 4 Weeks

MATERIALS USED

- Step stool
- Ink pad
- Paper roll
- Inch tape

METHODOLOGY

EXPERIMENTAL STUDY

Before teaching the specific step up exercise and conventional physical therapy, the pre-test scores of stride length, stride length (affected, unaffected) cadence were taken.

The pre-test scores were measured using the ink foot print record method, before commencement of therapy. The subjects were instructed to step on an ink pad and they are asked to walk on a paper roll. The subjects informed walk on a 10 meter walkway with a plain sheet of paper on its surface.

The footprints from the sole of the feet were produced on a paper as the patients walked from one end of the walk way to the other end.

Two measurement of step length, stride length, natural speed, maximum speed, cadence, were made and average value were taken and it was considered as pre-test score.

STEP UP EXERCISE PROTOCOL

Included the three main activities

- Forward step up
- Backward step up
- Lateral step

The exercise sessions were commenced in therapist supervision and manual guidance, prior to the sessions the subjects were given following instruction.

Prior to stepping, the patients were given the following specific instructions:

- Stand with weight evenly distributed
- Step up at comfortable speed
- Look at the step if necessary but don't bend at the waist to do so
- Don't push on your thighs
- Return to evenly distributed weight bearing once upon step

In the first phase of exercise, subjects were initially instructed to lead with the paretic lower extremity during ascent and the non-paretic extremity during decent followed by second phase in which patient will be instructed to lead with non-paretic lower extremity during ascent and the paretic lower extremity during decent.

The step command prior to each repetition was 'ready, step on affected' or 'ready step on unaffected'. Upon completion of each step on, the patients were given a 'step down' command and instructed to return to the starting position.

The introduction begins with the subject toes distance is 4" from the step forward direction; with 4"from the step to lateral direction and 4" distance with heels from the step backward direction.

Each of above activity of step up exercise was repeated for 2 phase of exercises with a set of 10 reputation's in each phase.

The rest period of 1 minute was given after the conclusion of first phase and the rest period of 5 minutes were given after the conclusion of the set before progressing to the next direction.

The order of the leads side was changed in the first and second phase of exercise after the 2 weeks of therapy programme. step exercise were practised by using step stool constant step height of 15 cm that is 6 inches (length of 18 inches breadth of 13) progression of step length was given 2inches ranging between the 4 to 10 inches between 4 weeks.

Subjects were participated in 30 min step up programme 3 times a week for the duration of 4 weeks.

For each treatment (groups) and gait parameter, a relative percent mean change [from 0 week (pre-test) to 4 week (post-test)] was also evaluated

After completion each session of specific second phase of step up exercises program the subjects were receive conventional physical therapy program.

After completion of 4 week combined therapy subjects is re-evaluated using ink foot print method to find the post test score stride length, step length, cadence.

CONTROL GROUP

- Before teaching the specific up exercise and conventional physical therapy, the pre-test scores of stride length (affected, unaffected), step length (affected, unaffected), cadence were taken by using ink foot print method.

- Conventional rehabilitation includes – regular passive movements and stretching (range of motion) exercise twice daily. Activities in sitting, facilitation of gait, stair climbing, activities on tilting board, activities on mat, that help to improve gait parameters on post hemi paretic stroke subject.

FIRST LEVEL FORWARD STEP UP EXERCISE

DATA ANALYSIS

Comparison between Pre and Post Test Step length variation Experimental and control subjects

Experimental Group

Parameter In cm	Mean ± SD		Mean difference	P-Test Value
	Pre Test	**Post Test**		
Step length Affected	39.64±14.31	48.26±14.31	8.62	0.003[**]
Step length Unaffected	37.02±14.24	47.04±12.21	10.0	0.005[**]
Stride length Affected	77.95±26.08	96.87±24.51	19.02	0.01[**]
Stride length Unaffected	77.95±26.56	94.01±25.81	19.9	<0.001[**]

Control Group

Parameter In cm	Mean ± SD		Mean Difference	P-Test Value
	Pre Test	**Post Test**		
	44.33±8.99	48.26± 9.72	3.93±3.48	0.288[*]

Step length Affected			
Step length Unaffected	41.73±12.24	46.95±11.41	5.23	0.399$^{\mathbf{x}}$
Stride length Affected	87.51±19.41	96.31±19.14	8.83	0.262$^{\mathbf{x}}$
Stride length Unaffected	85.90±19.40	95.16±19.16	9.12	0.248$^{\mathbf{x}}$

$^{\mathbf{xx}}$ P<0.001 - Highly Significant $^{\mathbf{x}}$ P>0.001 – Not Significant

MEAN STEP LENGTH
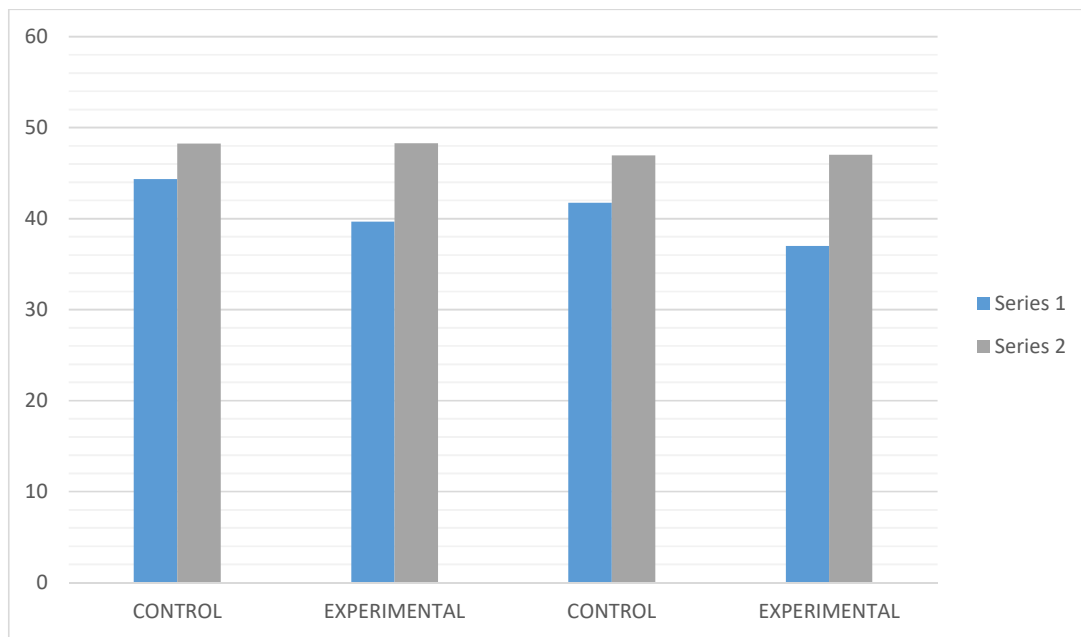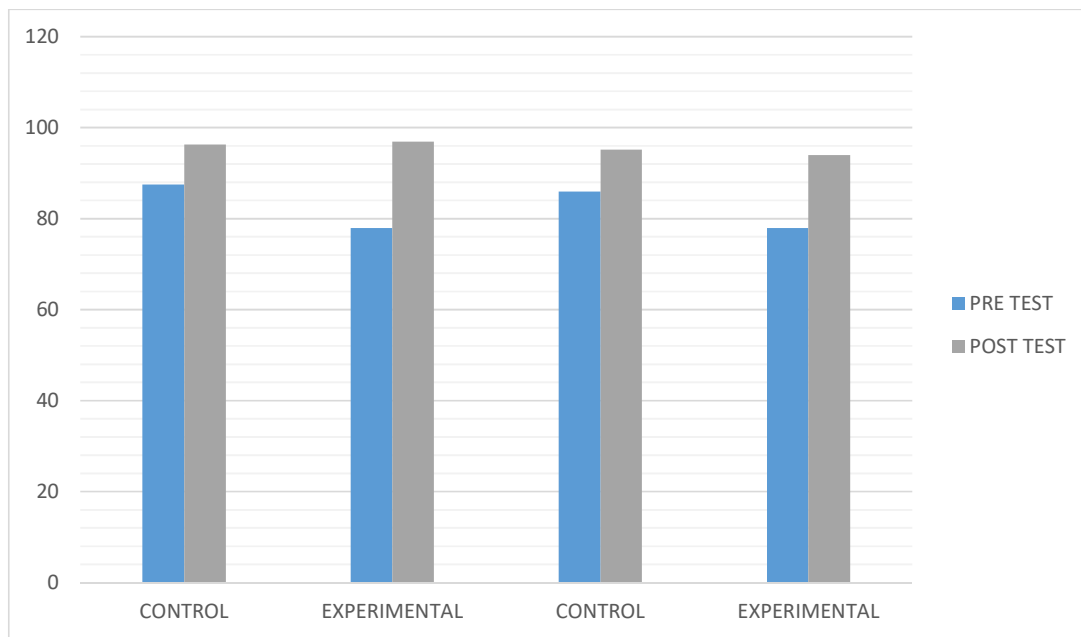

Step length affected   step length unaffected

The pre and post treatment step length of two groups.

MEAN STRIDE LENGTH

Stride length affected   stride length

The pre and post treatment stride lengths of two groups.

RESULTS AND DISCUSSION

RESULTS

The study was on 30 subjects, which consists of 15 subjects in each group with the duration of 4 weeks. The results show that, the mean value of independent variables between pre and post test scores of experimental group shows significant difference in improvement.

Paired "T" test value of pre and post test scores shows more significant difference in experimental group.

Mean value of independent variables between pre and post test scores of control group shows less significant difference in experimental group.

Paired "T" test value of pre and post test scores shows less significant difference in control group.

Chi square analysis also shows significant difference in experimental group.

The post test score analysis of dependent variables by using unpaired "t" test also shows the significant improvement in experimental group than control group.

DISCUSSION

30 Subjects were taken to find out efficacy of specific step up exercise with conventional physical therapy on improving gait parameter in stroke patients.

In this study, statistical analysis is showed that specific step up exercise with conventional physical therapy revealed significant improvement in gait parameters.

On comparing the step, stride length on affected/unaffected side and cadence between groups in pre-test did not show significant difference.

In post-test mean change all out comes measures between the groups were differed significantly. The outcome measures mainly step length in affected and unaffected side, the stride length affected and unaffected side. The cadence in both has increased after the intervention was evidence higher in experimental group.

The results of the study also suggests that patients who received step up exercises have increased the step length in affected and unaffected sides, stride length and cadence than those who received the conventional physical therapy.

The reason beyond this was step up exercise intervention additionally reinforces, the balance, strength and loading on affected and unaffected limb. **(Laufer Y et al 2000)** it was further supported by **(Kirishige tat euchi 2006)** lateral step up exercises were found to increase loading response by influencing, the shifting of COG to enforced through the recruitment of gluteus medius activity of supporting leg and adductor longus of stepping leg.

The result of this study also supports the standard and alternative hypothesis.

CONCLUSION

CONCLUSION

The result of this study concluded that specific step up exercise with conventional physical therapy showed better improvement in the gait parameters of stroke patients than that of conventional physical therapy alone.

LIMITATIONS

LIMITATIONS OF THE STUDY

The study was limited only to specific population (stroke patients).

Sample size of the study was small to derive accurate conclusion.

The duration is only 4 weeks and here the long term improvement of this programmes are not obvious with the study.

RECOMMENDATIONS

Similar study can be conducted on large scale.

Similar study can be conducted on other population.

Duration of the study can be increased.

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REFERENCE

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INFORMED CONSERN FORM

I -------------------------------------- agree to participate in the research conducted by MR. M.SUGAN, II year MPT (neuro) **"Efficacy of specific step up exercise with conventional physical therapy versus conventional physiotherapy alone on gait parameters in stroke".**

I acknowledge that the research study has been explained to me and I understand the agreeing to participate in the research means I am willing to,

1. Provide information about my health status to the researcher(s).
2. Allow the researcher(s) to have access to my professional records pertaining to the purpose of study risk.
3. Participate in training programme for duration of 6 weeks.
4. Make myself available for follow up.
5. Understand and follow the home advices that will be provided.

I have been informed about the purpose, procedures, measurements and risks involved in the research and my queries towards the research have been clarified.

I provide consent to the researcher to use this information, video recordings, for the research and educational purpose only.

I understand that my participation is voluntary and can withdraw at any stage of the research project.

Name of the participant   Date

Signature

APPENDIX

NEUROLOGICAL EVALUATION

DEMOGRAPHIC DATA

- Name
- Age
- Sex
- Occupation
- Data of admission
- Data of assessment
- Chief complaints
- Past medical history
- Present medical history
- Personal family history

VITAL SIGNS

- Temperature
- Pulse
- Respiratory rate
- Blood pressure

ON OBSERVATION

- Built
- Posture
- External appliances
- Skin changes

ON EXAMINATION

- Higher function
- Level of consciousness
- Orientation
- Memory

Vision

- Speech

- Hearing
- Communication

CRANIAL NERVE EXAMINATION

- Sensory examination
- Superficial sensation
- Deep sensation
- Cortical sensation

MOTOR ASSESSMENT

- Tone
- Reflexes
- Superficial reflexes
- Deep reflexes
- Voluntary control
- Range of motion
- Co-ordination
- Balance reaction
- gait

VARIABLES	PRE TEST		POST TEST	
	AFFECTED	UNAFFECTED	AFFECTED	UNAFFECTED
STEP LENGTH				
STRIDE LENGTH				

ACTIVITIES OF DAILY LIFE

MASTER CHART

Sl. No.	Step length (affected)				Step length (unaffected)				Stride length (affected)				Stride length (unaffected)			
	EXPERIMENTAL GROUP		CONTROL GROUP		EXPERIMENTAL GROUP		CONTROL GROUP		EXPERIMENTAL GROUP		CONTROL GROUP		EXPERIMENTAL GROUP		CONTROL GROUP	
1	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
2	53.95	62.58	53.2	57.98	51.21	59.25	58.97	58.3	34.17	119.82	105.3	114.32	104.03	115.45	106.2	121.38
3	52.89	60.95	50.1	55.68	50.98	50.99	52.98	55.27	37.0	116.89	104.9	112.98	105.8	110.8	105.8	120.88
4	48.78	59.89	53.1	55.98	49.68	47.45	51.34	50.68	37.90	113.9	100.9	111.0	100.98	113.65	100.98	118.66
5	50.56	55.56	55.3	52.77	48.89	48.88	50.67	48.75	36.09	100.7	99.0	98.97	99.5	111.87	99.5	102.1
6	44.88	54.67	40.1	50.73	45.78	45.58	48.67	46.75	33.78	101.89	88.67	87.67	98.7	100.9	98.7	100.8
7	46.68	51.44	48.9	47.87	42.78	43.65	46.63	30.95	31.34	106.8	98.78	64.98	66.7	99.99	66.7	75.9
8	44.65	51.33	46.3	48.50	46.56	38.90	47.78	28.75	30.87	98.76	97.76	65.66	88.9	88.75	88.9	88.78
9	33.34	50.89	45.8	47.55	41.23	37.90	46.98	26.98	25.87	95.78	88.09	66.90	87.4	68.78	87.4	99.9
10	31.95	49.99	43.1	43.46	40.89	46.78	40.65	27.99	11.23	99.78	86.98	65.97	70.3	65.89	70.3	45.67
11	30.11	48.88	41.1	41.26	30.78	49.90	38.94	26.22	12.56	38.89	83.76	73.89	71.8	67.78	71.8	59.88
12	28.78	37.89	40.6	40.26	32.56	31.98	36.98	24.78	13.65	73.87	82.56	76.46	73.7	78.0	73.7	64.78
13	20.93	35.99	39.9	40.10	44.98	33.89	34.34	25.75	14.54	72.54	80.43	72.0	50.7	69.90	75.99	66.0
14	28.88	34.00	38.7	39.58	30.78	33.00	31.75	24.33	15.98	70.78	79.67	75.67	70.00	72.18	70.0	67.98
15	26.89	34.99	36.9	39.68	28.76	36.06	30.99	23.75	17.99	69.78	68.98	75.89	69.4	70.98	69.4	70.18