A COMPARATIVE STUDY ON EFFECTIVENESS OF OVERGROUND WALKING WITH TREADMILL TRAINING ON IMPROVING LOCOMOTION OF STROKE PATIENTS

Dissertation work submitted to

THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY,

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MASTER OF PHYSIOTHERAPY

Degree programme

Submitted by

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Dissertation work entitled

A COMPARATIVE STUDY ON EFFECTIVENESS OF OVERGROUND WALKING WITH TREADMILL TRAINING ON IMPROVING LOCOMOTION OF STROKE PATIENTS

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Under the guidance of

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Dissertation submitted to

THE TAMILNADU DR. M. G. R. MEDICAL UNIVERSITY,

CHENNAI-32.

Project work evaluated on ----------

Internal Examiner External Examiner

CERTICATE I

This is to certify that the dissertation work entitled **"A COMPARATIVE STUDY ON EFFECTIVENESS OF OVERGROUND WALKING WITH TREADMILL TRAINING ON IMPROVING LOCOMOTION OF STROKE PATIENTS"** was carried out by **Reg. no.27092320** P.P.G College of physiotherapy, Coimbatore-35, affiliated to The Tamilnadu Dr. M.G.R medical university, Chennai-32, under the guidance of prof**. S . JOEL GODFREY BETTRAM . M.P.T (Neuro)., MIAP.,**

Dr. K. RAJA SENTHIL M.P.T (Cardio-Resp).,MIAP.,PhD

Principal

CERTIFICATE II

This is to certify that the dissertation work **"A COMPARATIVE STUDY ON EFFECTIVENESS OF OVERGROUND WALKING WITH TREADMILL TRAINING ON IMPROVING LOCOMOTION OF STROKE PATIENTS"** Was carried out by **Reg. No.27092320** P.P.G College of physiotherapy Coimbatore-35, affiliated to The Tamilnadu Dr. M.G.R. Medical University, Chennai-32, under my Guidance and direct supervision.

Prof. S. JOEL GODFREY BETTRAM M.P.T (Neuro)., MIAP.,

GUIDE

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A COMPARATIVE STUDY ON EFFECTIVENESS OF OVERGROUND WALKING WITH TREADMILL TRAINING ON IMPROVING LOCOMOTION OF STROKE PATIENTS.

ABSTRACT

Objective: To find out the effectiveness of overground walking with treadmill gait training in stroke patients**.**

Methods: 30 Subjects were selected on the basics of inclusion and exclusion criteria. All the subjects were divided equally into two groups, control Group and experimental Group based on Simple Random Sampling Technique. Before starting the training, pre-test scores are measured by using cadence and stride length. Control group received overground walking and experimental group received overground walking with treadmill gait training for 30 minutes, and both the groups received conventional therapy. At the end of five months, post-test scores of both groups were taken by used measure the cadence and stride length.

Results: Overground gait training with Treadmill gait training group showed better improvements in mobility and gait speed, When compared to over ground gait training group.

Conclusion: Improvement of locomotor function including mobility and speed is seen in hemiplegic persons when intensively trained on a overground walking and treadmill training.

Key words: Treadmill gait training, overground gait training, mobility, gait speed, hemiplegia

INTRODUCTION

"STROKE" is an acute onset of neurological dysfunction due to abnormality in cerebral circulation with resultant signs and symptoms that correspond to the involvement of focal areas of the brain. Among all the neurological diseases of adult life, the cerebral vascular ones clearly rank first in frequency and importance. It is one of the most common cause of disability among adults in the world and third leading cause for death.

In India, the stroke prevalence is the range of 200 per 1, 00,000 Populations. The men have higher incidence of stroke than women and it has greater incidence in population aged 60-75 yrs.

The severity of neurological deficit in stroke affected patients depends on the locomotion and extent of lesion and the amount of collateral blood flow. In case of anterior cerebral artery infarction or hemorrhage, lower limbs are more severely affected. The walking speed and gait cycle duration will be affected.

Neurological deficit that impair locomotion are residual motor weakness, poor motor control and spasticity that all results in altered gait pattern, poor balance, risk of falls and increased energy expenditure during walking function consequence of this neurological deficit often predispose the stroke survives to a sedentary life style.

Ambulation or the restoration of gait is a primary functional goal in the rehabilitation of stroke patients. To reach that aim, physiotherapy techniques like Bobath approach in over ground gait training. Bobath approach includes facilitatory and reflex inhibitory movements. It inhibits the abnormal pattern and facilitates the normal pattern of movement. Treadmill is a

motorized or with a movable platform to walk on it. It is a recent therapeutic approach that minimize the delay in gait training that can initiate with neurological patients.

Traditionally physiotherapy plays a vital role on treating stroke patients, on total functionality. The contribution of those approaches are less in improving in improving gait. Recent literatures say that a isolated aim of physiotherapy techniques is needed to improve the gait component individually.

Also recent advance said that by bobath approach on gait will give some more benefits to these patients. Along with bobath approach the treadmill training also help to improve the gait component individually. We needed to do further research study on the effectiveness of bobath gait training approaches and treadmill training to do the betterment of theses patients.

Thus, the present study intended to compare the effect of over ground walking training with the over ground walking training with treadmill training on improving gait parameters in subacute hemiparetic stroke. Which may, facilitates to find out the most effective treatment to improve the locomotion of hemiparetic patients, which helps them to get back to their normal life and may be added as literature for further research studies.

NEED FOR THE STUDY

Stroke is the third leading cause of death and most common cause of disability among adults. Long term loss motor function was perceived as a major problem in middle cerebral artery syndrome and there is an obvious need to develop effective treatment method for hemiplegia.

The research world recognized the importance of "gait" information many years ago and today there are numerous group worldwide organizing conferences to discuss issues that relate gait profiles to medical conditions. However, the benefit of these research and development activities is not being received by clinical practitioners or the end user.

To describe the different applications that would benefit from a reliable and quantifiable method of monitoring a person's gait. It also describes the different technologies that are, applied to those applications. Generally gait analysis covers stride length, stride rate (rhythm) and speed, and joint angle.

Only few studies are available regarding the effects over ground walking and treadmill training, so there is a need to do further support the over ground walking with treadmill training in post stroke patients.

OPERATIONAL DEFINITION

TREADMILL

A treadmill is a stationary machine that has a motor or flywheel that turns a conveyor belt at operator-determined speed. This allows you to run or walk at the speed the conveyor belt is moving to get a work out similar to running or walking outside.

MELANIE BEACH

STROKE

Stroke is a sudden onset of focal neurological deficit resulting from ischemic or heamorrhagic lesions in the brain.

WHO

BOBATH APPROACH

Bobath concept is an active, functional, re-education process aimed at improving the quality of life in patients with central nervous system deficits by enabling them to develop new strategies for completing the tasks in their daily living.

BOBATH

STRIDE LENGTH

It is the linear distance between two successive events that are accomplished by the same lower extremity during gait. The approximate stride length for men is 2.5 feet and women 2.2feet.

REBECCA L. CRAIK

CADENCE

Cadence is defined as the number of steps per unit of time. The normal mean cadence value is 112.5 steps/min, with the normal range of 100-120 steps/min.

REBECCA L. CRAIK

AIM OF THE STUDY

- To compare the effectiveness of over ground walking with treadmill training on improving locomotion of stroke patients.

OBJECTIVES OF THE STUDY

- To find out the effectiveness of over ground walking on improving locomotion of stroke patients.
- To find out the effectiveness of over ground walking with treadmill training on improving locomotion of stroke patients.
- To compare the effectiveness of over ground walking and over ground walking with treadmill training on improving locomotion of stroke patients.

HYPOTHESIS

NULL HYPOTHESIS

- There is no significant difference in over ground walking with treadmill training on improving locomotion of stroke patients.

ALTERNATE HYPOTHESIS

- There is significant difference in over ground walking with treadmill training on improving locomotion of stroke patients.

REVIEW OF LITERATURE

- **Urska Puh and Gillian D. Baer, et al., (2009)**

Ten independently ambulant chronic stroke patients were included in the study. Vicon™ was used to collect spatio-temporal and joint kinematic data during overground walking at comfortable speed and at matched speed on the treadmill. Differences suggest it may be useful to use treadmill in conjunction with overground walking to focus on improving specific walking deficits in patients with stroke.

- **Klaus Kaae Anderson, et al., (2009)**

Suggested that stroke most often occurs within the age range 40 to 55 years and about 85% of strokes are caused by ischemia.

- **Pohl M, et al., (2008)**

Conducted a study on 40 ambulatory post stroke patients and they were divided into 2 groups of 20 in each. The variables assessed were over ground walking speed, cadence, stride length and functional ambulation category scores. After a 4 week training period by the speed dependent treadmill training (STT) in post stroke patients. Which gives better walking abilities for over ground walking than conventional gait training.

- **Smith G, et al., (2005)**

Conducted an experimental study of the minimum post stroke interval was 3 months and each treatment phase lasted 3 weeks and other motor functions tested by the gait

cycle parameters, functional ambulation category and muscle tone rated by the modified ashworth spasticity scale the results showed treadmill training was more effective with regarding to restoration of gait ability and walking velocity.

- **Mudge S, et al.,(2003)**

Conducted an experimental study for the 30 patient. The patient is treated with body weight support treadmill training and further 4 weeks of treatment withdrawal and the functional independence measure were collected in all phases of the study. The result of the study of treadmill training has significant improvement and carry over to balance in a subject with chronic hemiplegia.

- **Ellen Winchell Miller, et al.,(2002)**

Conducted an experimental study on 30 hemiparetic patients to compare the effectiveness of treadmill walking and MRP .the selected patient were divided into 2 groups. Both groups were assessed by berg balance scale, step length and walking speed. The result showed that the treadmill walking was more effective then motor relearning programme.

- **Sullivan, K, Knowlton B, Dabkin B, et al., (2002)**

They conducted study on 30 subjects of chronic stroke in non randomized control design for four to five weeks period, shows improving of over ground walking training .

- **Werner C, et al.,(2002)**

Conducted a randomized study in 28 non-ambulatory hemiparetic patients. They were divided into two groups as group A and group B. Three weeks of base line of conventional therapy was followed by 15 sessions of physiotherapy and treadmill training. The result clearly showed that 3 weeks of treadmill training with conventional gait training accelerated the regaining of gait ability in hemiparetic subjects

- **Eich J, et al.,(2002)**

Conducted a randomized controlled study in sub acute stroke patients. Select 50 patients were divided into two groups. Walking velocity and capacity were measured. Experimental group and controlled group were examined for the results. It proved that treadmill with Bobath walking training was better than Bobath walking alone in the improvement of walking velocity and capacity in strokes patients.

- **Nilsson, L et al., (2001)**

This study reveals that over ground walking with treadmill training gives an effective improvement in gait pattern after stroke period than over ground walking alone.

- **LauyerY, et al., (2001)**

They conducted study on 25 subjects post acute stroke stage on non randomized cohort design on compared with over ground walking and treadmill with over ground walking for three weeks, gives treadmill with over ground walking improved gait pattern.

- **Laufery, et al., (2001)**

Conducted a study on 25 individuals in the early stage of rehabilitation following a stroke. The experimental group participated in 15 session of treadmill training and the control group received the same length of overground ambulation. The variable measured were functional walking ability, speed, stride length and EMG of calf muscle, the findings suggested that treadmill training was more effective than conventional gait training for improving gait parameters such as stride length and cadence.

- **Moseley A.M., et al (2000**)

Conducted an experimental study on 80 hemiparetic patients to compare the effectiveness of treadmill walking and over ground walking. The selected patients were divided into two groups. First groups was trained by treadmill and second group was trained by over ground walking for 4 months. Both groups were assessed by gait parameters such as speed and walking dependency. The result of the study indicated that the treadmill walking and significant effect on improving speed in the hemiparetic patients.

- **Visintin, M, et al., (1998)**

He conducted a study on 100 subjects in post stroke phase with treadmill gait training with over ground walking for a period of six weeks, shows that 79% of sample progressed to full weight bearing walking.

- **Nilsson L., et al., (1998)**

Conducted an experimental study on 73 hemiparetic patients to compare the effectiveness of treadmill walking and overground walking. The selected patients were

grouped into 2 categories. First group receive treadmill walking and second group received overground walking. Gait parameters were measured by step length, speed and cadence. The result of this study showed that the treadmill walking had significant effect on improving gait parameters in hemiparetic patients.

- **Herse S et al., (1995)**

  In this study overall, patients in group A and group B were treated with over ground walking and over ground walking with treadmill training, shows an apparent improvement in their gait pattern. But the group B shows better improvement than group A.

- **Hesse S.,et al.,(1994)**

  Conducted an experimental study of the minimum post stroke interval was 3 months and each treatment phase lasted 3 weeks and other motor functions tested by the gait cycle parameters, functional ambulation category and muscle tone rated by the modified ashworth spasticity scale the results showed treadmill training was more effective with regarding to restoration of gait ability and walking velocity.

- **Waagford.J. et al.,(1990)**

  Conducted an experimental study on 24 hemiparetic patients to investigate the effects of treadmill walking. The selected patients were divided into two groups. First groups received treadmill walking and the second group received conventional gait velocities, step length, stride length and cadence. The result of the study indicated that the treadmill walking was more effective than conventional gait training.

MATERIALS AND METHODOLOGY

MATERIALS

- Treadmill unit
- Mirror
- Pencil and inch tape
- Towel
- Chair
- Color ink

METHODOLOGY

STUDY DESIGN

- Experimental study design with pretest and posttest.

STUDY SAMPLE

- Study sample consists of 15 subjects in each group.

STUDY METHOD

- Subjects were divided into control group and Experimental group.

STUDY SETTING

- Aswin multispecialty hospital, Coimbatore**.**
- Devi Hospital, Erode.
- Senthil Neuro Hospital, Erode

PERIOD OF STUDY

- Five months.

INCLUSION CRITERIA

- First attack of stroke
- Within 28 days of post stroke
- Both male and female subjects.
- Aged between 45 to 55 years of age
- Unilateral hemiparesis (right sided sub acute stroke)
- Postural Assessment Scale for Stroke Patients (PASS) Scoring item 5 and Criteria <2

EXCLUSION CRITERIA

- Insufficient cognition / language.
- Improper proprioception.
- Cardiac and pulmonary problems, seizure.
- Obesity (body weight over 110kg)
- Any pre-morbid history of orthopeadic conditions or any other problems would preclude patient from relearning to walk.

MEASUREMENT PARAMETER

- cadence (steps / minute)
- stride length(in centimeters)

TREATMENT TECHNIQUES

Contol Group

Techniques For Overground Walking [Bobath Gait Training]

- Moving pelvis forward over affected leg to prevent hyper extension of knee.
- Weight bearing and balancing of affected leg. Flexion of affected side knee with hip extended and lowered to allow for forward step without circumduction.
- Patient should perform small alternating movement of flexion and extension of the affected side knee.
- Downward pressure applied on affected side foot to control and inhibit excessive spasticity while patient makes forward step.

Experimental Group

Techniques For Overground Walking [Bobath Gait Training]

- Moving pelvis forward over affected leg to prevent hyper extension of knee.
- Weight bearing and balancing of affected leg. Flexion of affected side knee with hip extended and lowered to allow for forward step without circumduction.
- Patient should perform small alternating movement of flexion and extension of the affected side knee.
- Downward pressure applied on affected side foot to control and inhibit excessive spasticity while patient makes forward step.

Techniques For Treadmill Gait Training

- In this technique motorized treadmill was used. The subject was instructed to stand on the platform of treadmill with hand rail support and without elevation of platform.
- The machine was set at a speed 0.25m/sec to 1.5 m/sec.

STATISTICAL TOOLS

The statistical tools used in the study were paired t- test and unpaired t- test.

Paired t-test

Paired t- test to assess the changes within the group.

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$\bar{d}$ – mean deviation

n – total number of subjects

s – standard deviation

$\sum d^2$ - sum of squared deviation

Unpaired t- test

Unpaired t- test to assess the changes between the group.

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S} \sqrt{\frac{N_1 N_2}{N_1 + N_2}}$$

$$S = \sqrt{\frac{\sum\left(X1 - \bar{X1}\right)^2 + \sum\left(X2 - \bar{X2}\right)^2}{N1 + N2 - 2}}$$

X_1 - mean of control group.

X_2 - mean of experimental group.

N_1 – number of subjects in experimental group.

N_2 – number of subjects in experimental group.

S - standard deviation

PROCEDURE OF STUDY

After getting informed consent 30 subjects selected using purposive sampling techniques and assigned into two groups.

Control group and Experimental group given over ground walking and over ground walking with treadmill training respectively. Walking was performed and evaluated before and after the intervention of control group and Experimental group by measuring cadence and stride length. Pre test and post test data were collected, tabulated, analyzed using “t” test and tested for significance.

DATA PRESENTATION

Table -I

Pre test and post test value of cadence of control group and experimental group.

S. No	**Control group** Over ground walking Cadence (steps/min)		**Experimental group** Over ground walking with treadmill training Cadence (steps/min)	
	Pre test	Post test	Pre test	Post test
01	68	69	70	78
02	67	68	76	80
03	58	61	69	75
04	63	66	76	82
05	57	59	62	68
06	61	63	57	66
07	52	55	51	65
08	38	41	64	70
09	40	42	69	76
10	55	57	73	79
11	38	41	58	65
12	57	60	51	59
13	61	63	75	80
14	59	61	68	75
15	60	63	54	66

Table - II

Pre test and post test value of stride length of Control group and Experimental group.

S. No	**Control group** Over ground walking Stride length (cm)		**Experimental group** Over ground walking with treadmill training Stride length (cm)	
	Pre test	Post test	Pre test	Post test
01	36	40	40	48
02	35	38	42	50
03	34	36	35	43
04	40	42	33	40
05	36	38	36	43
06	44	47	39	45
07	31	42	46	51
08	28	32	50	55
09	32	34	46	51
10	30	33	44	49
11	36	40	37	44
12	40	42	39	47
13	35	38	42	48
14	28	32	40	48
15	36	38	43	50

DATA ANALYSIS AND INTERPRETATION

This section deals with analysis and interpretation of data collected from control group and experimental group, who went over ground walking and over ground walking with treadmill training.

Control group [cadence]

Table iii represents the mean values, mean difference, standard deviation and paired t- test value between pretest versus post test values of cadence for control group who had been subjected to over ground walking training.

TABLE III

ANALYSIS OF PRETEST AND POST-TEST DATA OF CONTROL GROUP

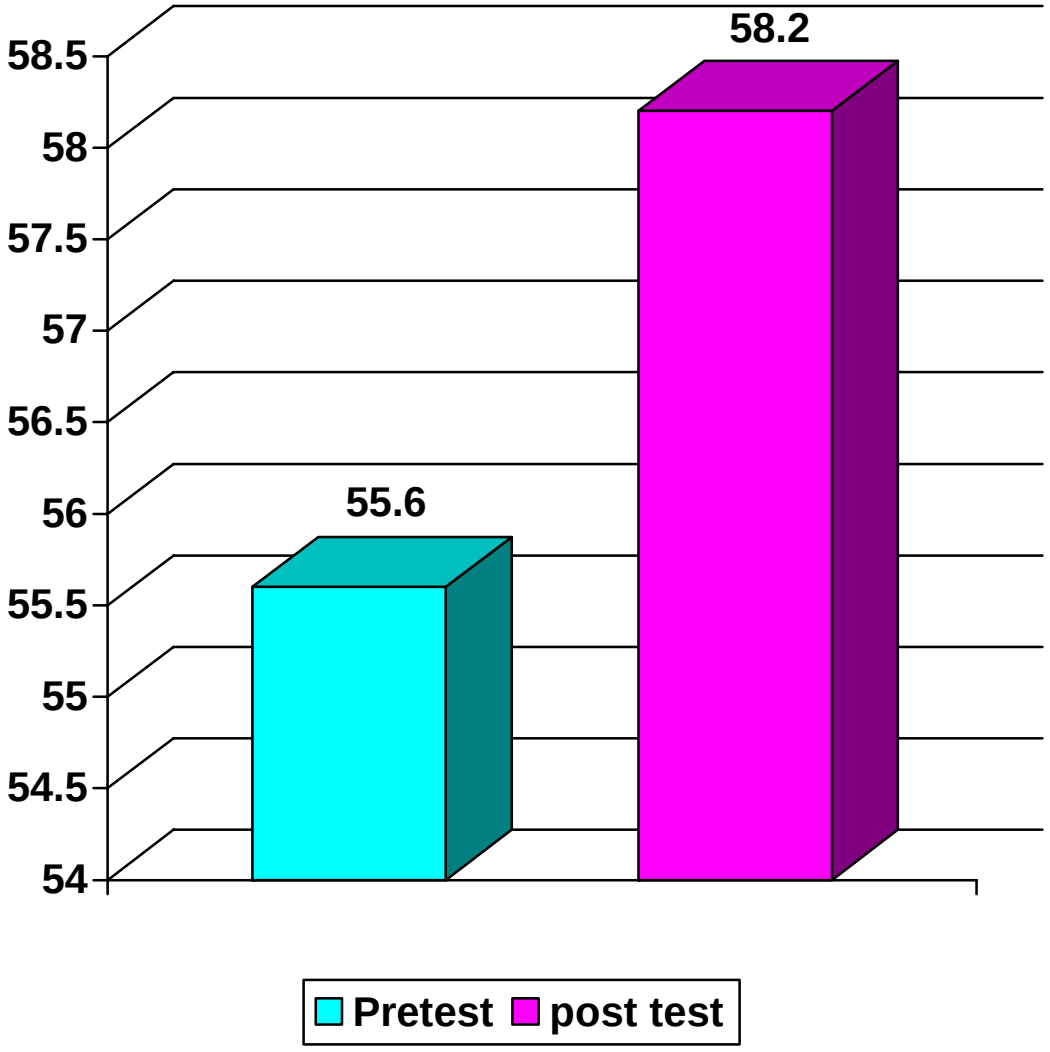
GROUPS	**Over ground walking [cadence]**	
Control group	Pre test mean value	Post test mean value
	55.60	58.20
Paired 't' test	12.15	
P value and its significance	P value < 0.05 is significant	

Table iii shows the analysis of cadence, the paired't' value of pre versus post sessions of control group was 12.15 at 0.05 level of significance which was greater than the tabulated 't' value of 1.833. This showed that there was a statistical significant difference in between pre and post test results. The pre test mean was 55.6 the post test mean was 58.2 and the mean difference was 2.6 which showed that there was a significant improvement in cadence in post test value in response to intervention.

GRAPH I

ANALYSIS OF PRE TEST AND POST TEST VALUES OF CONTROL GROUP

[CADENCE]



Experimental group [cadence]

Table iv represents the mean values, mean difference, standard deviation and paired t- test value between pre test versus post test values of cadence for experimental group, who had been subjected to over ground walking training and treadmill gait training.

TABLE IV

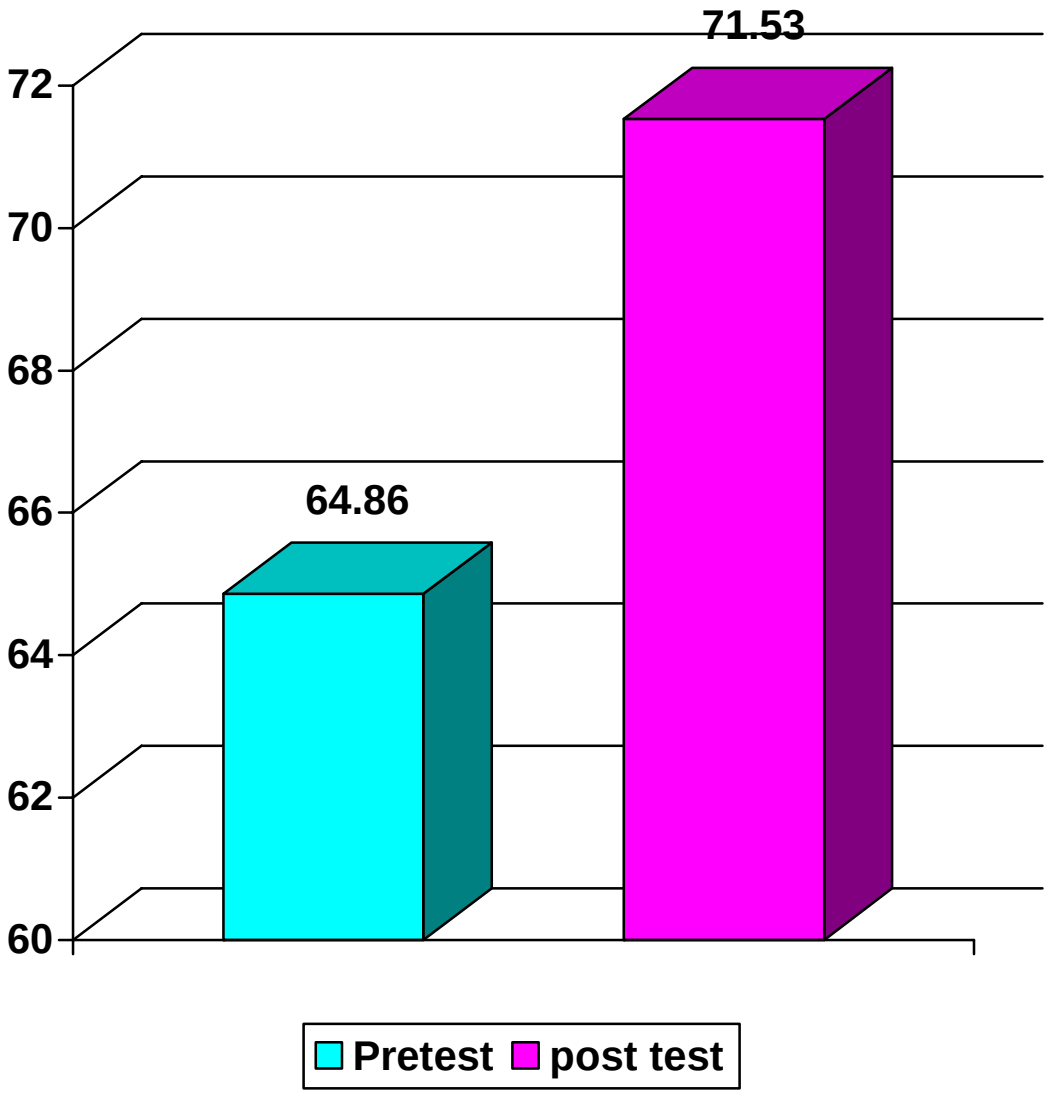
ANALYSIS OF PRETEST AND POSTTEST DATA OF EXPERIMENTAL GROUP

GROUPS	**Over ground walking and treadmill training [cadence]**	
Experimental group	Pre test mean value	Post test mean value
	64.86	71.53
Paired 't' test	18.21	
P value and its significance	P value < 0.05 is significant	

Table iv shows the analysis of cadence, the paired 't' value of pre versus post sessions of experimental group was 18.21 at 0.05 level of significance which was greater than the tabulated 't' value of 1.833. This showed that there was a statistical significant difference in between pre and post test results. The pre test mean was 64.86 the post test mean was 71.53 and the mean difference was 6.67 which showed that there was a significant improvement in cadence in post test value in response to intervention.

GRAPH II

ANALYSIS OF PRE TEST AND POST TEST VALUES OF EXPERIMENTAL GROUP [CADENCE]



Unpaired t test table [cadence]

Table v represents the comparative mean values, mean difference, standard deviation and unpaired t- test value between control group and experimental group on cadence.

TABLE V

ANALYSIS OF POST-TEST DATA OF CONTROL GROUP AND EXPERIMENTAL GROUP

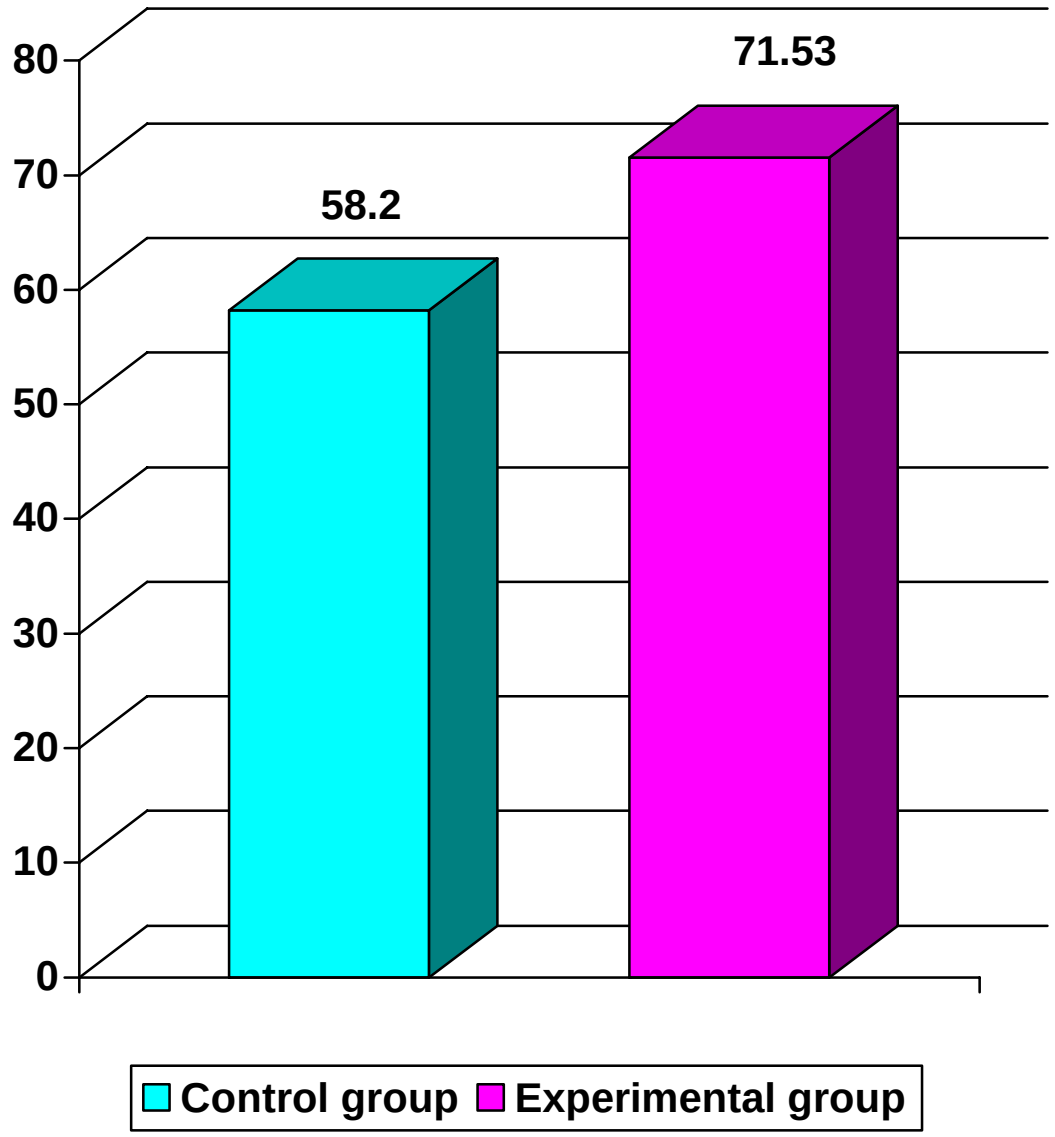
GROUPS	**Over ground walking and over ground walking with treadmill training [cadence]**	
Post test mean value	Control group	Experimental group – II
	58.2	71.53
Un Paired 't' test	4.24	
P value and its significance	P value < 0.05 is significant	

Table - v shows the analysis of control group and experimental group with cadence. The unpaired 't' value was greater than the tabulated 't' value of 4.24 at 0.05 level of significance which showed that there was statistically significant differences between control group and experimental group, the mean value of control group was 58.2 the mean value of experimental group was 71.53 and the mean difference was 13.33 which showed that there was greater improvement in experimental group than control group.

Therefore, the study is rejecting the null hypothesis and accepting the alternate hypothesis.

GRAPH III

ANALYSIS OF POST TEST VALUES OF CONTROL GROUP AND EXPERIMENTAL GROUP [CADENCE]



Control group [stride length]

Table vi represents the mean values, mean difference, standard deviation and paired t- test value between pre test versus post test values of stride length for control group who had been subjected to over ground walking training.

TABLE VI

ANALYSIS OF PRETEST AND POST-TEST DATA OF CONTROL GROUP

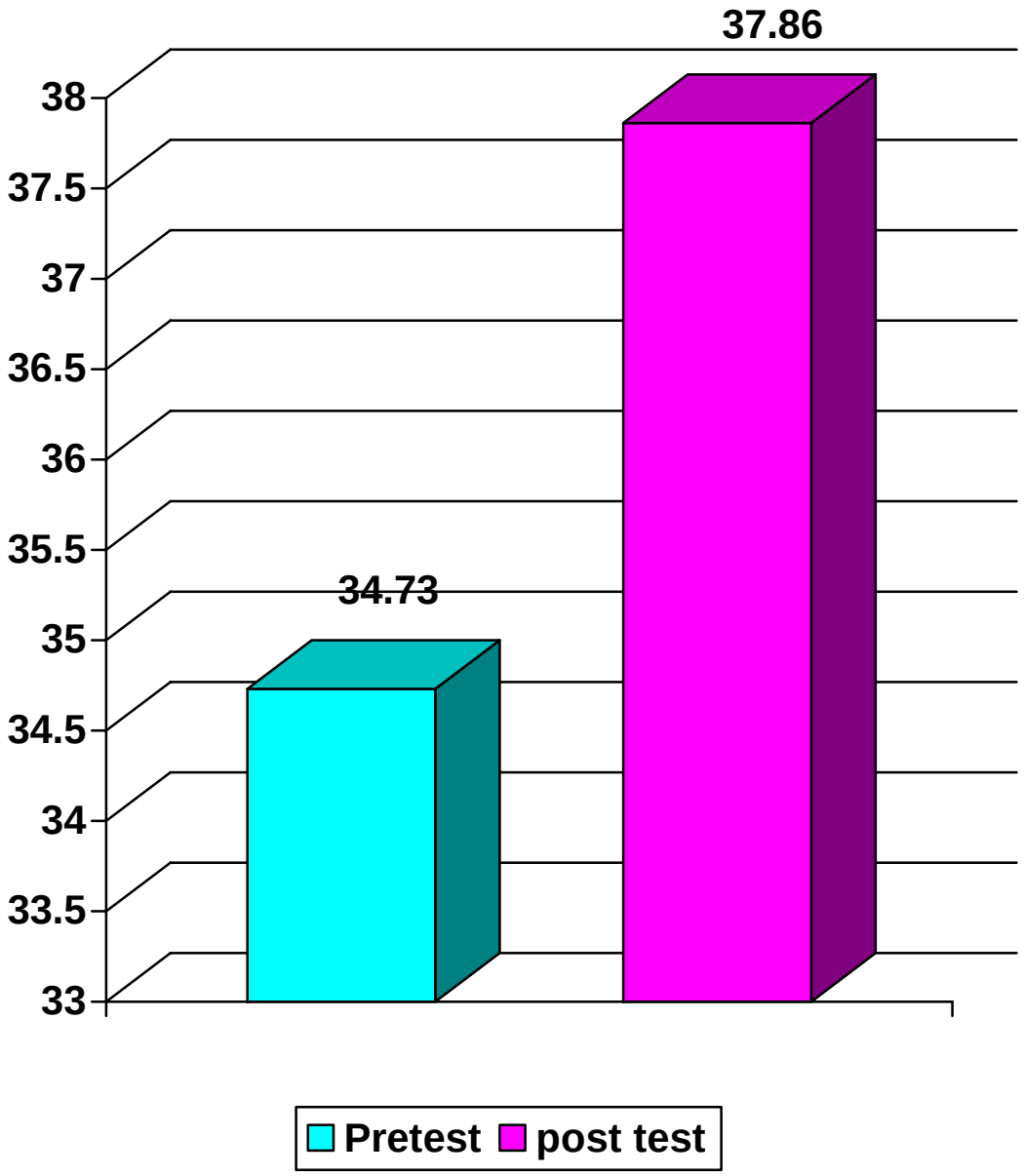
GROUPS	**Over ground walking [stride length]**	
Control group	Pre test mean value	Post test mean value
	34.73	37.86
Paired 't' test	8.97	
P value and its significance	P value < 0.05 is significant	

Table VI shows the analysis of stride length, the paired 't' value of pre versus post sessions of control group was 8.97 at 0.05 level of significance, which was greater than the tabulated 't' value of 1.833. This showed that there was a statistical significant difference in between pre and post test results. The pre test mean was 34.73 the post test mean was 37.86 and the mean difference was 3.13 which showed that there was a significant improvement in stride length in post test value in response to intervention.

GRAPH IV

ANALYSIS OF PRE TEST AND POST TEST VALUES OF CONTROL GROUP

[STRIDE LENGTH]



Experimental group [stride length]

Table vii represents the mean values, mean difference, standard deviation and paired t- test value between pretest versus post test values of stride length for experimental group who had been subjected to over ground walking training with treadmill gait training.

TABLE VII

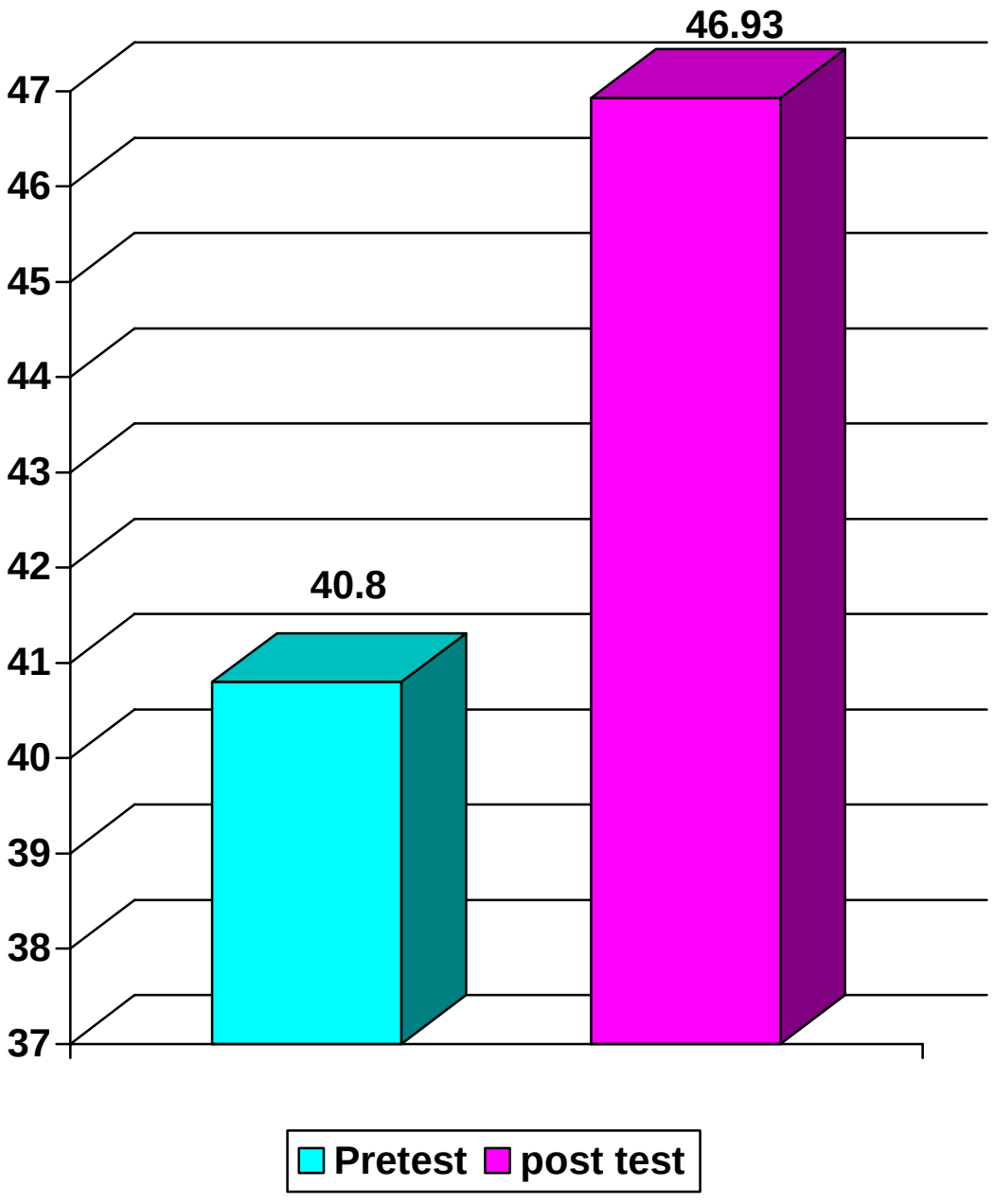
ANALYSIS OF PRE TEST AND POSTTEST DATA OF EXPERIMENTAL GROUP

GROUPS	**Over ground walking and over ground walking with treadmill training [stride length]**	
Experimental group	Pre test mean value	Post test mean value
	40.80	46.93
Paired 't' test	10.24	
P value and its significance	P value < 0.05 is significant	

Table vii shows the analysis of stride length, the paired 't' value of pre versus post sessions of experimental group was 10.24 at 0.05 level of significance which was greater than the tabulated 't' value of 1.833.This showed that there was a statistical significant difference in between pre and post test results. The pre test mean was 40.80 the post test mean was 46.93 and the mean difference was 6.13 which showed that there was a significant improvement in stride length in post test value in response to intervention.

GRAPH IV

ANALYSIS OF PRE TEST AND POST TEST VALUES OF EXPERIMENTAL GROUP [STRIDE LENGTH]



Unpaired t test table [stride length]

Table viii represents the comparative mean values, mean difference, standard deviation and unpaired t- test value between control group and experimental group on stride length.

TABLE VIII

ANALYSIS OF POST-TEST DATA OF CONTROL AND EXPERIMENTAL GROUP

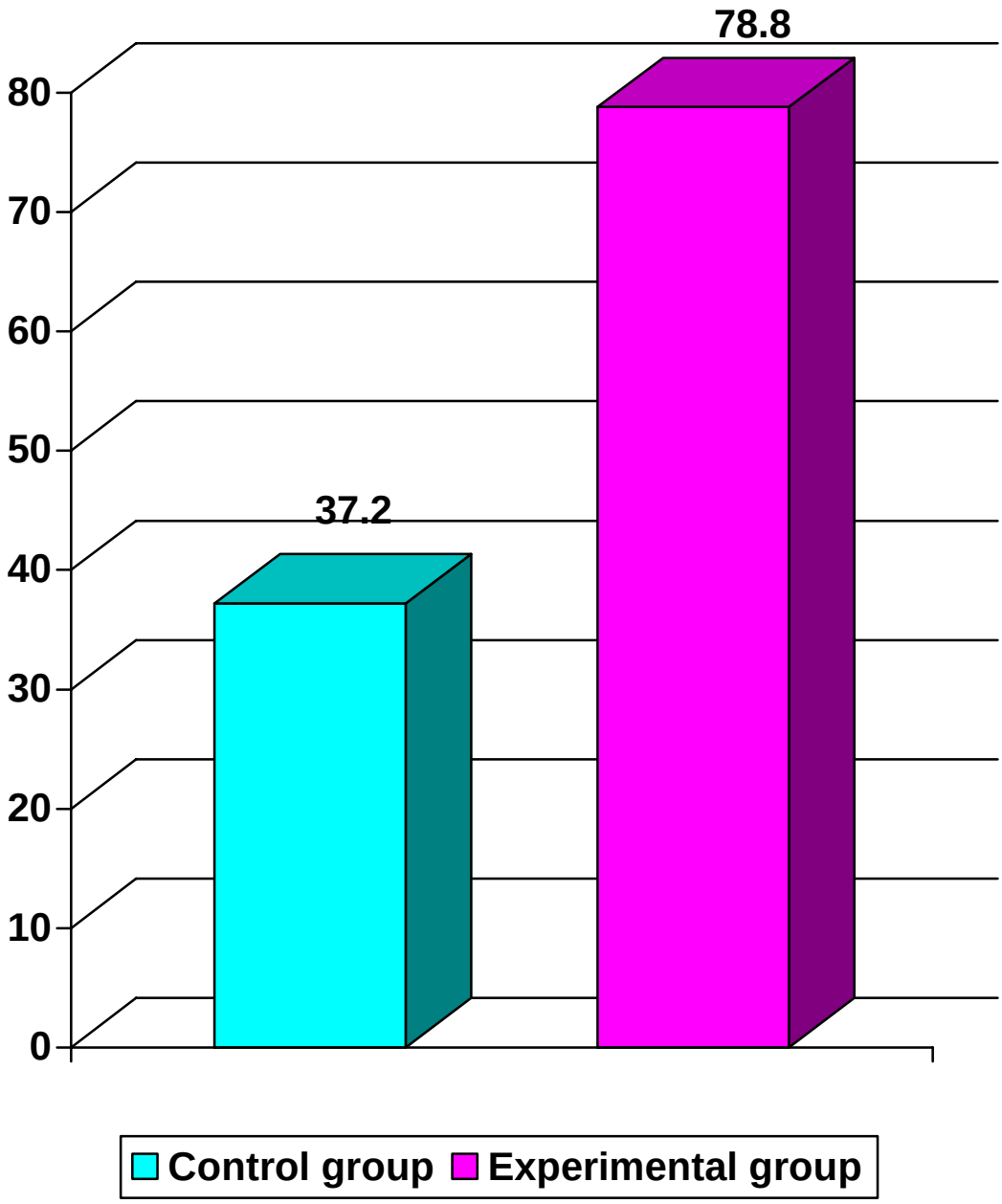
GROUPS	**Over ground walking and over ground walking with treadmill training [stride length]**	
Post test mean value	Control group	Experimental group
	37.86	46.93
Un Paired 't' test	5.78	
P value and its significance	P value < 0.05 is significant	

Table viii shows the analysis of control group and experimental group with stride length. The unpaired 't' value was greater than the tabulated 't' value of 5.78 at 0.05 level of significance which showed that there was statistically significant differences between control group and experimental group. The mean value of control group was 37.86, the mean value of experimental group was 46.93 and the mean difference was 9.07 which showed that there was greater improvement in experimental group than control group.

Therefore, the study is rejecting the null hypothesis and accepting the alternate hypothesis.

GRAPH VI

ANALYSIS OF POST TEST VALUES OF CONTROL GROUP AND EXPERIMENTAL GROUP [STRIDE LENGTH]



VI.RESULT

Effectiveness of control group is elicited comparing the pre test and post test values of control group using paired‘t’ test; the calculated value is 12.15 , whereas the critical value is 1.761. Since the calculated value is greater than the critical value, there exists a significant difference between the pretest and post test values of control group. When comparing the mean values of both, the post test mean value 58.20 is greater than the pre test mean value 55.60 which confirms that there is a significant improvement in gait component [cadence] of stroke patients.

Effectiveness of Experimental group is elicited by comparing the pretest and post test values of Experimental group using paired ‘t’ test, the calculated value is 18.21 , whereas the critical value is 1.761. Since the calculated value is greater than the critical value, there exists a significant difference between the pretest and post test values of Experimental group. When comparing the mean values of both, the post test mean value 71.53 is greater than the pre test mean value 64.86, which confirms that there is a significant improvement in gait component [cadence] of stroke patients.

While comparing the post test value of control group and experimental group subjects using unpaired‘t’ test is 4.24 where as the critical value is 1.761. Since the calculated value is more than the critical value, it states that there is significance difference between the post values of both control group and experimental group. Hence, it confirms that there is a significant improvement in post test value of experimental group than the post test value of control group. Hence the alternative hypothesis is accepted.

Effectiveness of control group is elicited comparing the pre test and post test values of control group using paired ‘t’ test; the calculated value is 8.97 , whereas the critical value is 1.761. Since the calculated value is greater than the critical value, there exists a significant difference between the pretest and post test values of control group. When comparing the mean values of both, the post test mean value 37.86 is greater than the pre test mean value 34.73 which confirms that there is a significant improvement in gait component [stride length] of stroke patients.

Effectiveness of Experimental group is elicited by comparing the pretest and post test values of Experimental group using paired ‘t’ test, the calculated value is 10.24 , whereas the critical value is 1.761. Since the calculated value is greater than the critical value, there exists a significant difference between the pretest and post test values of Experimental group. When comparing the mean values of both, the post test mean value 46.93 is greater than the pre test mean value 40.80, which confirms that there is a significant improvement in gait component [stride length] of stroke patients.

While comparing the post test value of control group and experimental group subjects using unpaired‘t’ test is 5.78 where as the critical value is 1.761. Since the calculated value is more than the critical value, it states that there is significance difference between the post values of both control group and experimental group. Hence it conforms that there is a significant improvement in post test value of experimental group than the post test value of control group. Hence the alternative hypothesis is accepted.

DISCUSSION

The rehabilitation of the stroke is a challengeable task. Many therapeutic approaches are currently available. However, considerable controversy exists about their effectiveness. Experimental studies are designed to compare the neuro physiological treatment approaches to stroke. Adding a specific intervention such as treadmill training and bobath technique will be more effective in proving the various treatment approaches to the stroke rehabilitation.

For this purpose 30 stroke patients were recruited and divided into control group and experimental group. First group was assigned as control group which comprised 15 subjects and received overground walking training and the second group the experimental group received overground walking training with treadmill. Measurements such as cadence and stride length were recorded. The results from the recorded measurements proved that the overground walking training with treadmill training were more effective than the group treated with overground walking training in improving gait parameters in stroke.

Which is also supported by Nilsson. L, et. al., (1998) they suggests that treadmill walking has significant effect on improving gait parameters such as cadence and stride length in hemiparetic patients.

A further study by Pohl.M et al (2002), concludes that over ground walking and treadmill training gives better result than conventional therapy.

Studies conducted by Harris- Lore Ml, Macko Rf (2006) supported the bobath approach in gait training gives better result in overground walking.

Laufery, et al (2001) Conducted a study on 25 individuals, suggest that treadmill training was more effective than conventional gait training for improving gait parameters such as stride length and cadence.

Waagford. J. et al., (1990) conducted a experimental study, The selected patients were divided into two groups. First groups received treadmill walking and the second group received conventional gait velocities, step length, stride length and cadence training. The result of the study indicated that the treadmill walking was more effective than conventional gait training.

Based on the statistical analysis and interpretation the results of the present study shows that there was significant increase in cadence and stride length in subacute hemiparetic patient treated with combined overground walking training and treadmill gait training than with overground walking training alone.

SUMMARY AND CONCLUSION

SUMMARY

The objective of the study is to find out the effectiveness of the combined effect of overground walking and treadmill training on gait parameters in post stroke hemiparetic patients.

To conduct this study a total number of 30 sub acute stroke patients were selected. Cadence and stride length were taken as parameters to measure the gait parameters. The pretest data were collected for control group and experimental group. Patients of control group were given overground walking training and experimental group patients were given overground walking training and treadmill walking. The results of the post test of control group and experimental group were recorded for comparisons after five months of treatment. The paired "t" test was used to compare the pretest and post test results of control group and experimental group separately. The unpaired "t" test was used to compare the mean difference of control group and experimental group.

In the analysis and interpretation of cadence and stride length between control group and experimental group, the unpaired 't' value was calculated. Which showed that there was a significant increase in cadence and stride length in experimental group when compared to control group in response to treatment.

CONCLUSION

Thus, the study concluded that the combined over ground walking training and treadmill training was the effective treatment for sub acute stroke patients. Also cadence and stride length could be used as the assessment tool for sub acute stroke patients.

LIMITATIONS AND SUGGESTIONS

- This study was done with smaller sample size, a similar study can be conducted with large samples.
- Parameters such as cadence and stride length was used in my study, a similar study can be conducted with walking velocity, step length and degree of toe out as parameters to document the gait in sub acute stroke patients.
- A similar study can be conducted with cadence and step length to document the gait in other neurological conditions such as cerebellar lesion.
- This study was done with bobath technique with treadmill training, a similar study can be conducted with MRP technique and treadmill training to find out the effectiveness on different parameters.
- The study done for acute stroke with less than 1 month duration similar study can be done with chronic stroke patients.
- Presenting Postural Assessment Scale (PASS) of 5 grade was included further study can be done with other grades also.

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APPENDIX –1

PROTOCOLS AND SCALES

1.1 OVER GROUND TRAINING PROTOCOL

Over ground gait training protocol for an individual includes walking training on a over ground for a maximum of 30 minutes, 3 days a week, for a total 4 weeks. The major emphasis for gait training was on methods of training support and propulsion of lower limbs, balance of the body mass over one or both feet and control of the foot and knee path through swing. These were addressed by a combination of weight bearing and walking practice. The patient was fitted with a blood pressure cuff connected to the sphygmomanometer to record BP changes. The gait training consists of walking on a ground at a comfortable speed using walking aid and assistance. Patients were given rest periods of 2 minutes when they felt tired, light headed or the blood pressure exceeds >220 mm Hg for SBP and >110 mm Hg for DBP.

A. Training support and propulsion of lower limbs

- Hip and knee flexion over the side of the bed
- Knee extension with dorsi flexion
- Hip control with the hip in extension
- Lifting one leg at a time in sitting
- Sitting with affected leg crossed

B. Training balance of the body mass over one or both feet

- Standing on both feet close together
- Standing on affected leg

- Standing and weight transfers
- Manual perturbation to sideways
- Manual perturbation to forwards and backwards

C. Training control of foot and knee path through swing

- Releasing the hemiplegic leg in standing
- Releasing the knee with hemiplegic leg behind
- Taking small steps backwards with affected lg
- Walking sideways behind a line

D. Facilitation of gait Walking can be assisted providing the therapist is able to prevent abnormal patterns of movements and normal gait can be facilitated. Patient's pelvis is held on either side from behind and the action is made as smooth and rhythmic as possible. It is important to keep the affected hip well forward during the stance phase on that side so that the knee does not snap back into extension. Downward pressure on the pelvis during the swing phase helps him to release the knee instead of hitching the hip to bring the leg forward. The arm may be held forward to help overcome any flexion and retraction on the affected side or remain at his side without any associated increase of tone. As walking improves less assistance is required and a normal reciprocal arm swing can be facilitated by lightly rotating the trunk from the pelvis or shoulder.

1.2 TREADMILL TRAINING PROTOCOL

Subjects receive gait training on a motorized treadmill. All the subjects in the group receive gait training for a maximum of 30 minutes, 3 times per week for a total 4 weeks.

Before starting treadmill training protocol, 2 trial training is given to the subjects to make familiar with the training. All the participants will train in indoors only. The subject is fitted with a blood pressure cuff connected to the sphygmomanometer to record BP changes. The subject could also hold onto a horizontal bar attached to the front of the treadmill for stability. The treadmill permitted walking to be initiated from 0.2778m/sec and slowly advanced by 0.0554m/sec increments according to patient's subjective tolerance. The physiotherapist assisted if the patient could not actively lift the paralytic leg. The speed is adjusted to the patient's comfortable walking speed ranging between 0.38-0.49 m/sec. Subjects were given rest periods of 2 minutes when they felt tired, light headed or the blood pressure exceeds >220 mm Hg for SBP and >110 mm Hg for DBP.

1.3 CONVENTIONAL THERAPY PROTOCOL

A. Upper limb active ROM exercise

- Shoulder girdle- elevation and protraction
- Gleno humeral joint- abduction, forward flexion and extension
- Elbow joint- flexion and extension
- Radioulnar joint- pronation and supination
- Wrist joint- flexion and extension
- MCP joint- flexion and extension
- CMC of thumb- flexion, extension, abduction, adduction and opposition
- IP joint- flexion and extension

B. Lower limb active ROM exercise

- Hip joint- flexion and extension, abduction and adduction, Internal and external rotation
- Knee joint- flexion and extension
- Ankle joint- dorsi flexion and platar flexion
- Subtalar joint- inversion and eversion

C. Functional mobility exercise

- Bed mobility exercise
  - ✓ Rolling to affected side
  - ✓ Rolling to unaffected side
  - ✓ Bridging on pelvis
  - ✓ Prone on elbow
  - ✓ Prone on hands
  - ✓ Supine lying to sitting
  - ✓ Isolated knee extension in lying
  - ✓ Moving to sideways, forwards and backwards
  - ✓ Weight transfers through the arm behind and sideways
  - ✓ Lift both legs together and rotates in sitting
  - ✓ Reaching sideways, forwards and downwards in sitting

- Sitting to standing and standing to sitting with or without support
- Walking on parallel bar

D. Balance training

- Wooble board with support
- Forward stepping, backward stepping
- Bridging

Each subject in both Groups receives above treatment in 5 repetitions, once daily, 3 times a week for 4 weeks.

APPENDIX - 2

THE POSTURAL ASSESSMENT SCALE FOR STROKE PATIENTS (PASS)

1. Sitting without support (sitting on the edge of an 50-cm-high examination table [a Bobath plane, for instance] with the feet touching the floor)

0=cannot sit

1=can sit with slight support, for example, by 1 hand

2=can sit for more than 10 seconds without support

3=can sit for 5 minutes without support

2. Standing with support (feet position free, no other constraints)

0=cannot stand, even with support

1=can stand with strong support of 2 people

2=can stand with moderate support of 1 person

3=can stand with support of only 1 hand

3. Standing without support (feet position free, no other constraints)

0=cannot stand without support

1=can stand without support for 10 seconds or leans heavily on 1 leg

2=can stand without support for 1 minute or stands slightly asymmetrically

3=can stand without support for more than 1 minute and at the same time perform arm movements above the shoulder level

4. Standing on nonparetic leg (no other constraints)

0=cannot stand on nonparetic leg

1=can stand on nonparetic leg for a few seconds

2=can stand on nonparetic leg for more than 5 seconds

3=can stand on nonparetic leg for more than 10 seconds

5. Standing on paretic leg (no other constraints)

0=cannot stand on paretic leg

1=can stand on paretic leg for a few seconds

2=can stand on paretic leg for more than 5 seconds

3=can stand on paretic leg for more than 10 seconds

Changing Posture

Scoring of items 6 to 12 is as follows (items 6 to 11 are to be performed with a 50-cm-high examination table, like a Bobath plane; items 10 to 12 are to be performed without any support; no other constraints):

0=cannot perform the activity

1=can perform the activity with much help

2=can perform the activity with little help

3=can perform the activity without help

6. Supine to affected side lateral

7. Supine to nonaffected side lateral

8. Supine to sitting up on the edge of the table

9. Sitting on the edge of the table to supine

10. Sitting to standing up

11. Standing up to sitting down

12. Standing, picking up a pencil from the floor

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APPENDIX – 3

INFORMED CONSENT FORM

TITLE: "EFFECTIVENESS OF OVERGROUND WALKING WITH TREADMILL TRAINING ON IMPROVING LOCOMOTION OF STROKE PATIENTS"

INVESTIGATOR: ……..

PURPOSE OF THE STUDY:

I…….. ,have been informed that this study will work towards achieving the normal gait training after stroke for me and other patients.

PROCEDURE:

Each term of the study protocol has been explained to me in detail. I understand that during the procedure, I will be receiving the treatment for a time per day. I understand that I will have to take this treatment for four months.

I understand that this will be done under ……'s supervision. I am aware also that I have to follow therapist's instructions as has been told to me.

CONFIDENTIALITY:

I understand that medical information provided by this study will be confidential. If the data are used for publication in the medical literature or for teaching purpose, no names will be used and other literature such as audio or video tapes will be used only with permission.

RISK AND DISCOMFORT:

I understand that there are no potential risks associated with this procedure, and understand that …….. will accompany me during this procedure. There are no known hazards associated with this procedure.

REFUSAL OR WITHDRAWL OF PARTICIPATION:

I understand that the decision my participation is wholly voluntary and I may refuse participate, may withdraw consent at any time during the study.

I also understand that the investigator may terminate my participation in the study at any time after she has explained me the reasons to do so.

I …… have explained to ……. the purpose of the research, the procedures required and the possible risks and benefits, to the best of my ability.

…… ……

Investigator Date

I ……. Confirm that ……. has explained me the purpose of the research, the study procedure and the possible risks and benefits that I may experience. I have read and I have understood this consent to participate as a subject in this research project.

…….. ……

Subject Date

…….. …….

Signature of the Witness Date