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EFFICACY OF EXTERNAL FOCUS OF ATTENTION IN IMPROVING BED MOBILITY IN HEMIPLEGIC PATIENTS.

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ABSTRACT

Objectives: To find out the efficacy of external focus of attention in improving bed mobility in hemiplegic patients.
Method: A sample of 30 patients satisfying the inclusion criteria were randomly assigned into a control group and an experimental group of 15 patients each. The control group received bed mobility training without external focus of attention. In experimental group external focus of attention was used to give bed mobility training . The treatment was for 6 days. The outcome measure taken was Trunk Control Test. Pre and post values were taken on the first day and sixth day of treatment.
Results: Statistical analysis using Wilcoxon signed-ranks test and Mann-Whitney 'U' test showed significant difference in improvement in bed mobility status of patients treated with external focus of attention.
Conclusion: External focus of attention for training bed mobility seems to be beneficial for hemiplegic patients.

Key words: External focus of attention, Hemiplegic patient, Bed mobility.

INTRODUCTION

Stroke (Cerebrovascular accident – CVA) is defined as "A focal (or at times global) neurological impairment of sudden onset, and lasting more than 24 hours (or leading to death), and of presumed vascular origin[1] Several population-based surveys on stroke were conducted from different parts of India. During the last decade, the age adjusted prevalence rate of stroke was between 250-350/100,000. The ratio of cerebral infarct to hemorrhage was 2.21. The estimation of stroke mortality derived was 102000 deaths, which represented 1.2% of total deaths in the country[2]

Although stroke rehabilitation has to some extent progressed over the years, there is still lack of enthusiasm in pursuing the goal of ensuring that each patient recovers his best possible function[3] Often however, a gradual return of some motor abilities occurs in weeks and months after injury. The severity of trunk impairment is usually less than more distal musculature. Poor recovery of trunk muscle performance results in a severe disability and a reduction in the activities of daily living. In stroke rehabilitation, trunk muscle performance is an important factor in predicting the functional outcome [4].

In patients with hemiplegia trunk control is an indispensable basic motor ability for execution of many functional tasks[5]. Turning to the intact side and sitting up over the side of the bed are critical to the re establishment of independence. However for individuals who cannot perform these without assistance, it is important to help them into the sitting position. In this way training to re-establish swallowing, communication, visual scanning of the environment, attentional capacity and the ability to balance and move can start early[6].

Motor learning research with its focus on discovering laws and principles underlying the acquisition of motor skills had little impact on clinical applications in physical therapy[7]. Feedback is an effective method in motor learning which can be used in the rehabilitation of neurological patients.[8-11]. Feedback can be extrinsic or intrinsic. During early motor learning the therapist will provide extrinsic feedback to shape performance. During early intervention visual inputs are critical for motor learning[12] Learning strategies may be used for the patients with hemiplegia who is required to transfer across a variety of surfaces including obstacles of varying heights and distances apart. An external focus of attention may yield a learning advantage for the activity being practiced because the automatic control processes underlying the activities such as those associated with balance and stability are allowed to operate freely[13]. Careful planning of content, scheduling and attentional focus induced by the feedback can enhance the effectiveness of training considerably. However, research examining these issues in stroke patients is scarce[14].

In this study bed mobility training is done with external focus of attention. For external focus the subject was asked to concentrate on a point made by a laser pointer, which reflects the performance of the patient. So the incorporation of attentional focus strategy in bed mobility training is studied here.

METHODOLGY

Study was approved by the institutional ethical committee, written informed consent was obtained from the participants. Study was conducted in the physiotherapy departments of General Hospital and Ananthapuri Hospital and research institute Trivandrum. Study design was experimental and 30 stroke patients with hemiplegia due to MCA territory involvement were selected using non probability convenient sampling and then they were assigned to control and experimental group of 15 each using random assignment. The selection criteria include male patients with first episode of stroke within the age group of 45 to 55 years. They should come under Brunnstrom's recovery stage[15] 2 and should have the ability to roll to the affected side and should have a MMSE score[16] minimum 20. Subjects having Hemi neglect, visual agnosia, visual field defects, aphasia, cerebral atrophy, cerebellar lesions, history of seizures, pressure sores cardio respiratory complications and orthopedic complications were excluded from the study.

Outcome measure used was Trunk control test (TCT). The inter-rater reliability and validity of TCT have already been reported[17,18] TCT examines four axial movements; rolling from supine position to weak side (T_1) and to strong side (T_2), sitting up from a lying down position (T_3) and sitting in a balanced position on the edge of the bed with feet off the ground for 30 seconds (T_4). The TCT score is the sum of the scores obtained on the four tests (range, 0-100). Material used was a laser pointer having a diode with wavelength 630 to 680 nm, and with a maximum output of < 1mw. Laser pointer was modified for attaching to the subjects body

Before starting the procedure subjects were tested using TCT. The control group received bed mobility training which includes rolling to the weak side and then to strong side, getting up from supine and sitting balance exercise. In addition to this subjects received exercises which include ROM, bridging and positioning strategies. For experimental group bed mobility training was done with external focus of attention. For this the laser pointer was strapped to the subject's chest and markings were made on the ceiling as well as on both side walls. When the laser is put on subject has to concentrate on the laser point on the ceiling and should try to move the point to the marking on the side wall. For training sitting balance laser is projected to the front wall where three markings were made. For all the exercises subject is given assistance for completion of task. When he gains control of the movement, the assistance is gradually lowered. The procedure was repeated for six days.

RESULTS

The results were analyzed with SPSS version 16 for windows using Wilcoxon signed-ranks test and Mann-Whitney 'U' test. The mean pre-test score of TCT for the control group was 34 (SD±18.33) and for the post-test was 59.07(SD±16.68). These values for the experimental group were 31.53(SD ±14.55) and 84.67(SD±11.84) respectively. From the analysis it can be seen that there is statistically significant difference between the pre and post test values of control group as well as experimental group. Furthermore when analyzing post-test values of the control and experimental group by Mann-Whitney test, statistically significant difference is there. This indicates that external focus of attention was effective than internal focus of attention in bed mobility training for the subjects. From the item wise analysis it can be seen that for the control group and for the experimental group all the items were improved significantly from the pre-test value. When analyzing the post-test values of the control and experimental group it is clear that there is significant difference between the post-test values of control and experimental group in all items except in T_1. (Rolling to weak side from supine) .It means that external focus of attention was better over conventional treatment in improving all the components of TCT except $T_{1.}$

Table 1. Demographic data

Group	Subjects	Age	Post stroke duration (days)	Right sided	Left sided
Control	15	51.26 (± 3.40)	8. 07 (± 3. 58)	7	8
Experimental	15	51.53 (±3. 23)	8.13 (±3.93)	9	6

Table 2. Analysis of pre and post test scores of TCT using Wilcoxon's Signed Ranks test

	TCT	Pre test	Post test	Z
		Mean	Mean	
Control	T1	15.47(±5.95)	24.13(±3.36)	-3.162*
	T2	5.6(±6.2)	14.67(±7.14)	-3.035*
	T3	1.6(±4.22)	4.8(±6.09)	-2.000*
	T4	11.33(±7.38)	15.47(±5.95)	-3.066*

	Total	34.00(±18.33)	59.07(±16.68)	-3.429*
Experimental	T1	12.87(±3.36)	25(0)	-3.162*
	T2	4(±5.86)	24.13(±3.36)	-3.035*
	T3	1.6(±4.22)	11.4(±8.77)	-2.000*
	T4	13.067(±8.77)	24.13(±3.36)	-3.066*
	Total	31.53(±14.56)	84.67(±11.84)	-3.420*

* $p < 0.05$

Table 3 Analysis of control and experimental group using Mann- Whitney U test.

	TCT	Control	Experimental	U	Z
		Mean	Mean		
Pre test	T1	15.47(±5.95)	12.87(±3.36)	90	-1.445
	T2	5.6(±6.2)	4(±5.85)	97.5	-0.733
	T3	1.6(±4.22)	1.6(±4.22)	112.5	.000
	T4	11.33(±7.38)	13.067(±8.77)	100.5	-0.568
	Total	34(±18.33)	31.53(±14.56)	112.0	-0.021
Post test	T1	24.13(±3.36)	25(0)	105	-1.000
	T2	14.67(±7.13)	24.133(±3.36)	37	-3.652*
	T3	4.8(±6.09)	11.4(±8.77)	66	-2.134*
	T4	15.47(±5.95)	24.133(±3.36)	37.5	-3.664*
	Total	59.07(±16.68)	84.67(±11.84)	26	-3.696*

* $p < 0.05$

Figure 1. Comparison of pre and post test scores of Control group

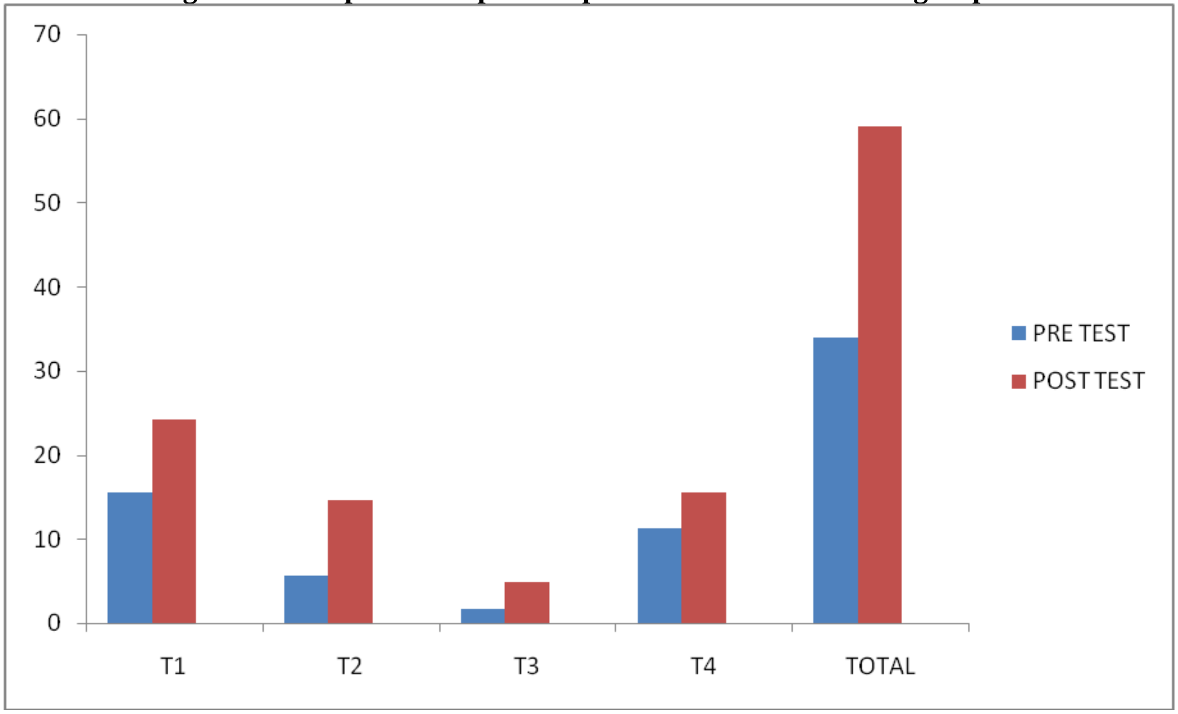


Figure 2. Comparison of pre and post scores of Experimental group

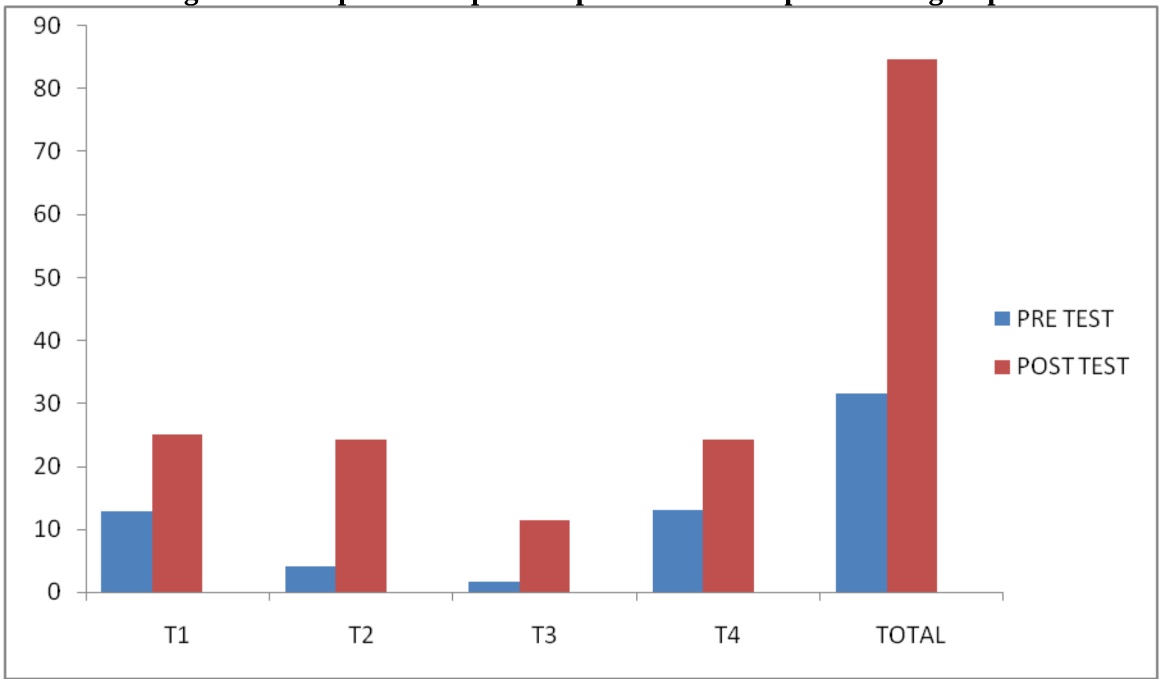
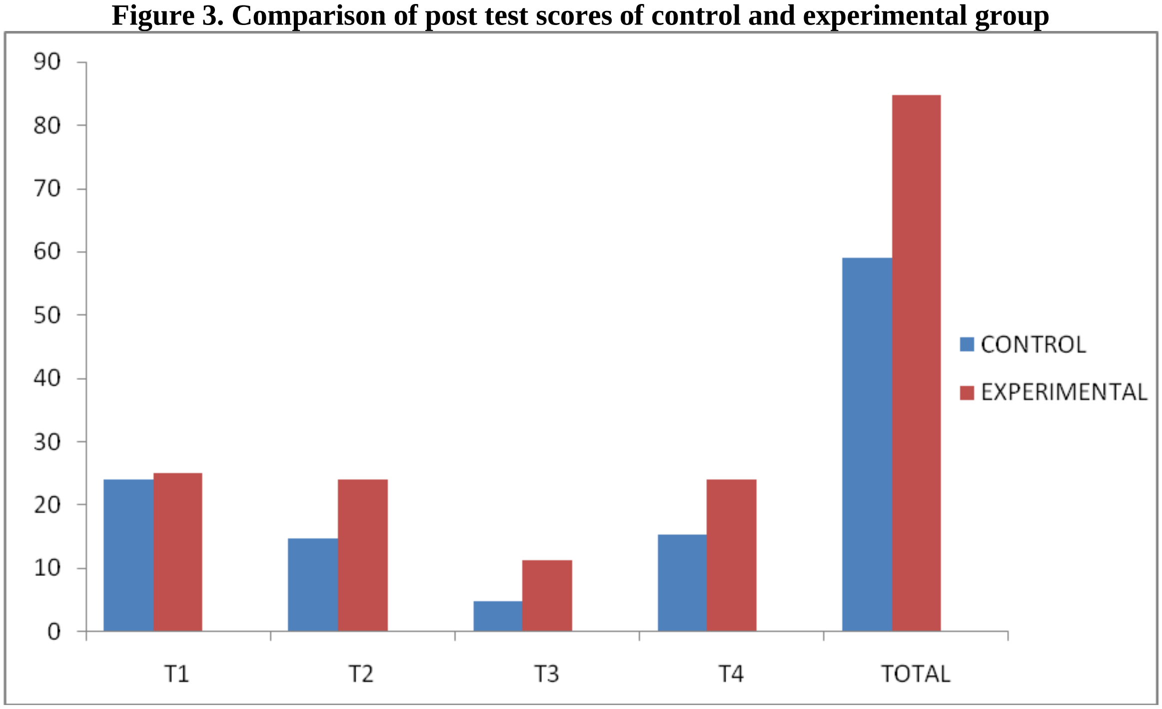


Figure 3. Comparison of post test scores of control and experimental group



DISCUSSION

Numerous studies have shown that instructions that direct individuals' attention to the effects of their movements on the environment thereby inducing a so called external focus of attention, were more effective for learning than instructions that direct attention to the movement themselves or inducing an internal focus.[19-23] After stroke, intrinsic feedback system may be compromised making it difficult for the person to determine what needs to be done to improve performance. Extrinsic feedback may thus be even more important to people with stroke.[14]

According to constrained action hypothesis[24,25] an internal attentional focus, or focus directed to something close to the body results in participants subtly interfering in relatively automatic control processes. As a result of this interference the degrees of freedom of the motor system are presumably constrained in such a way that the rate and effectiveness of the system to regulate movement or maintain balance is subtly compromised. Presumably there is a delicate balance between the conscious process and automatic process, which can be interfered with or overridden when the participant consciously intervene in the control process. This type of interference seems to occur to a lesser extent when the participants' attention is directed further away from the body and to the external effects.

Common coding theory[26,27] provides a possible explanation for the advantages of focusing on the effects of one's own movements, rather than on the movement themselves. Because according to this theory, perception and action requires a common representational medium, efferent and afferent codes are stored in the form of distal events. From this point of view, it makes sense to assume that action will be more effective if they are planned in terms of their intended outcome or effect, rather than in terms of the specific movement patterns.

When participants were practiced rolling, getting up from lying down and balance in sitting position, the internal focus used by the participants constrained the motor system by interfering with natural control processes, whereas the laser marker as the effect of the movement (external focus) allowed the automatic control processes to regulate the movements. Furthermore the subjects who used laser markings, the actions are planned in terms of there intended outcome, that is to the point to which the marker should move, rather than subjects who concentrated on their movement patterns.

On further analyzing the results it can be seen that all components of TCT improved significantly between post-test scores of control and experimental group except T_1 (Rolling towards weak side from supine). This may be probably because due to the selection criteria of subjects. All subjects included in the study were with a minimum score 12 for T_1. With 6 days of treatment most of the subjects in control and experimental group improved to the highest score, which are 25. So there was not a significant difference between the post-test scores of control and experimental group for the component T_1

One of the limitation in this study was it calculated only a short term outcome of the treatment. Effects of this improvement on the late functional outcome in subjects were not studied. Also sample size was small and subjects included were limited to males with MCA territory infarction. So studies can be conducted in large sample size in other areas of rehabilitation like hand rehabilitation, gait training using external focus strategy. Relationship between early independency in bed and late functional outcome using this strategy also can be studied.

CONCLUSION

Bed mobility training using external focus was better than the training was it is not used. When the subjects concentrated on the external effects it provided a better learning advantage for the subjects. External focus of attention for training bed mobility seems to be beneficial for hemiplegic patients.

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