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**COMPARISON OF MOTOR RELEARNING PROGRAM VERSUS BOBATH APPROACH AT EVERY TWO WEEKS INTERVAL FOR IMPROVING ACTIVITIES OF DAILY LIVING AND AMBULATION IN ACUTE STROKE REHABILITATION**

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**ABSTRACT**

The aim was to compare the effectiveness of Motor Relearning program (MRP) versus Bobath approach on Activities of Daily Living (ADL's) and ambulation at every two week's interval in Acute Stroke Rehabilitation in first six weeks of training. Randomized Control trial of 32 subjects with first unilateral stroke (middle cerebral artery territory involvement) participated in the study. Random allocation using block randomization in to two groups was done. Group A included 17 subjects received Motor Relearning Program (MRP) and Group B, 15 subjects received management based on Bobath approach for a period of six weeks. Functional Independence Measure and Barthel Index used for ADL's assessment and Functional ambulation category and Dynamic gait index for ambulation performance. Motor relearning program showed significant improvement in Barthel Index [90.21 (10.02) versus 58.2 (1), p<0.0014] and in Functional Independence Measure [118 (9.32) versus 77.17(14.96), p<0.05], Functional ambulation category [5.87(0.5) versus 3.7(0.62), p<0.0084], Dynamic Gait Index [12(5.7) versus 1.3(0.7), p<0.004] as compared to Bobath approach. Physiotherapy treatment using Motor Relearning program is more effective than Bobath approach in early enhancement of Activities of Daily Living (ADL's) and ambulation in Acute Stroke Rehabilitation when compared at every two interval initial six weeks of training and rehabilitation.

**Key Words:** *Motor Relearning Programme (MRP), Bobath Approach, Activities of Daily Living (ADL), Ambulation, Acute Stroke*

**INTRODUCTION**

Stroke is the leading cause of adult disability and the second leading cause of mortality worldwide (World Health Organization, 2003). It is a global health problem with an annual incidence of 0.2 to 2.5 per 1000 population. Sudden onset of stroke leads to the paralysis of one side body causing difficulty in mobility, ambulation and dependence in activities of daily life.

A retrospective analysis of data from 292 persons following their first stroke indicated that 75% were dependent in ADL at onset of stroke. Only 57% of the survivors, however, were dependent at the time they were discharged from the hospital (Dombovy *et al.*, 1988). The incidence of dependence in activities of daily living (ADL) is highest immediately after a stroke and decreases significantly thereafter (Bach-y-Rita *et al.*, 1988; Theorell *et al.*, 1984; Kotila *et al.*, 1984; Menderby *et al.*, 1986) Wade and Langton-Hewer (1987) found that the incidence of total dependence in ADL decreased from 58% at 1 week post stroke to 9% at 6 months post stroke. Ottenbacher and Jannell (1993) found that improvement in performance appears to be related to early initiation of treatment, age, and study design but not to duration of the intervention. Early intervention in acute stroke rehabilitation plays major role in restoration of function & reducing the degree of disability and dependence for ADL's and ambulation (Edzard-Ernst, 1990). Selection of appropriate and best neuro rehabilitation approach is critical.

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The historical perspective neuro rehabilitation approaches evolved from reflex theory of motor control & Hierarchical model of motor control. Approaches based on this concepts are Sensorimotor approach (Roods, 1940), Movement Therapy Approach (Brunnstorm, 1950s), Bobath Approach (1960-70s), Proprioceptive neuromuscular facilitation (PNF) Approach (Knot and Voss, 1960-70s). With development of theories of motor control of system theory of motor control, dynamic theory of motor control and biomechanics and new approaches developed. Based on dynamic System theory of motor control concepts different task specific training approaches developed such as Motor Relearning Program for Stroke (1980s), sensory integration and CIMT to advance concepts of robotic therapy, mental imagery, virtual reality, and locomotors training with body weight supported treadmill training and strength training. But still Roods approach; Brunnstorm Approach, PNF and Bobath Approach are commonly practiced and taught in India (Davison *et al.*, 2000). Gradually there is a change and Task specific training is gaining its importance and practice in acute stroke rehab. Out if these we have considered Bobath approach and motor relearning program in this study.

Bobath approach developed by Berta Bobath and Motor relearning program (MRP), outlined by Carr and Shepherd based on two different conceptual models of assessment and treatment. Bobath approach is neurodevelopment model based on reflex hierarchical model of motor control that is a problem-solving approach to the assessment and treatment of individuals with disturbances of function, movement and postural control due to a lesion of the central nervous system (Bobath, 1990). The Motor Relearning Programme (MRP) was developed by the Australian physiotherapists Janet Carr and Roberta Shepherd. It is a task-oriented approach to improving motor control, focusing on the relearning of daily activities. It is strongly based on theories in kinesiology that emphasize a distributed (rather than a hierarchal) motor control model. Motor Relearning Program (MRP) is based on task specific training which involves assessment and training in seven different task of daily life. There analysis of abnormal pattern movement in these task, correction of these abnormal patterns and repetitive practice of a task which can facilitate the development of new motor programs or the refinement of existing programs in order to improve performance of the task. It involves training & practice of these tasks in different environment and daily life situations (Carr *et al.*, 1987, 1998).

Previous study of Langhammer 2000, 2011, Krutulyte 2003 of comparison of Bobath and MRP showed that MRP is better in improving ADL's and Mobility in Acute stroke rehabilitation where as Van Vliet *et al.*, in 2005 found no difference in two groups. Even MRP showed to be beneficial long term as showed by follow up study at 4 years post stroke (Langhammer *et al.*, 2003). In our previous study on comparisons of MRP versus Bobath approach, we found MRP was better in improving ADL's and ambulation performance (Bhalerao *et al.*, 2011). But does it have any early benefit as compared to Bobath? Does it helps in better and early restoration of ambulation and activities of daily living when compared at the 2 weeks interval in first six weeks of acute stroke rehabilitation? So this study aimed to find does MRP shows better and early improvement than Bobath approach at every 2week interval.

## **MATERIALS AND METHODS**

### **Methodology**

Randomized Control Trial of 32 subjects with first unilateral stroke with middle cerebral artery territory involvement with onset of stroke two weeks before study participated in the study. Patient were randomly allocated in two group using block randomization was done. Group one, 17 subjects received Motor Relearning Programme (MRP) (Carr and Shepherd, 1987) and Group two, 15 subjects received Bobath approach (Ernst, 1990) for 1 hr/day for 6 days/wk for a period of six weeks.

Motor Relearning Program (MRP) is based on task specific training which involves assessment and training in seven different task of daily life. The programme is composed of guidelines for evaluating and improving 7 daily functions a) Upper limb function b) Oro-facial function c) Sitting up from supine d) Sitting e) Standing up and sitting down f) Standing g) Walking. Each section is composed of a description of normal activity (essential movement components). Mastery of a section is not necessary before going

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onto another section. There is no intent of progressing from one section to the next; the order of sections is not important. The patient must always be actively participating in the activity (without resistance) and given some opportunity to make mistakes. The Four Steps of the Motor Relearning Programme followed. 1. Analysis of task: observation, comparison, analysis. 2. Practice of missing components: explanation – Identification of goal, instruction, practice plus verbal and visual feedback plus manual guidance. 3. Practice of task: explanation – Identification of goal, instruction, practice plus verbal and visual feedback plus manual guidance, progression (increase complexity, add variety, decrease feedback and guidance), reevaluation, encourage flexibility. 4. Transfer of learning: opportunity to practice in context, consistency of practice and positive reinforcement, organization of self-monitored practice, structured and stimulating learning environment, involvement of relatives and staff.

There analysis of abnormal pattern movement in these task, correction of these abnormal patterns and repetitive practice of a task which can facilitate the development of new motor programs or the refinement of existing programs in order to improve performance of the task. It involves training & practice of these tasks in different environment and daily life situations (Carr, 1987, 1998).

In Bobath approach initial phase of rehab concentrated more positioning, handling, and transfer training, learning control of trunk, upper limb and lower limb. There is training of reactive postural control, protective reaction and equilibrium without task specific training. It also concentrated mainly on reduction of spasticity and avoidance of abnormal pattern of movement which limited the scope of direct training of activity (Bobath, 1990; Patricia, 2000).

Patient was trained in their activity of daily living along with training of motor control. They were observed in the task activity and the missing components of the task were trained and practice in the whole task. After learning the task completely they were made to practice in different environment and context. Patients were made to take the responsibility of analysis the task, correcting the missing component and practicing the learned activity in daily routine life.

At baseline both groups were similar on all outcome measures (Table 1). Data analysis was done by using Man Whitney U test for comparison of between two groups at every two weeks interval. Test of significance is set at 0.05.

## RESULTS AND DISCUSSION

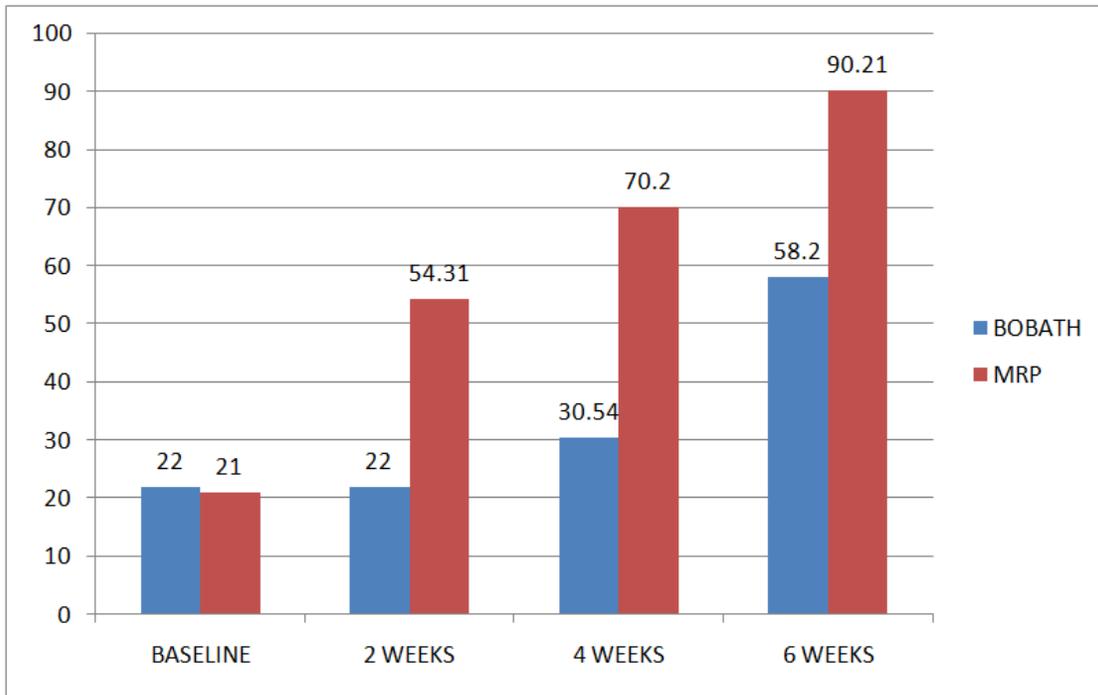
### Results

This study included 32 patients with age of average 54 years (10.9), 19 male and 13 females. Both group showed significant improvement in first 6 weeks of training. When both the group compared at intervals of 2 weeks for six weeks, MRP group showed significant difference in the improvement compared to Bobath group on scales of Barthel Index(BI), Functional Independence Measure (FIM), Functional ambulation category (FAC), starting at 2<sup>nd</sup> week & maintained at 4<sup>th</sup> & 6<sup>th</sup> weeks (Graph 1,2,3) except Dynamic gait index (Graph 4). On dynamic gait index there was no significant difference in up to 4<sup>th</sup> week but by 6<sup>th</sup> weeks MRP showed better improvement than Bobath Approach.

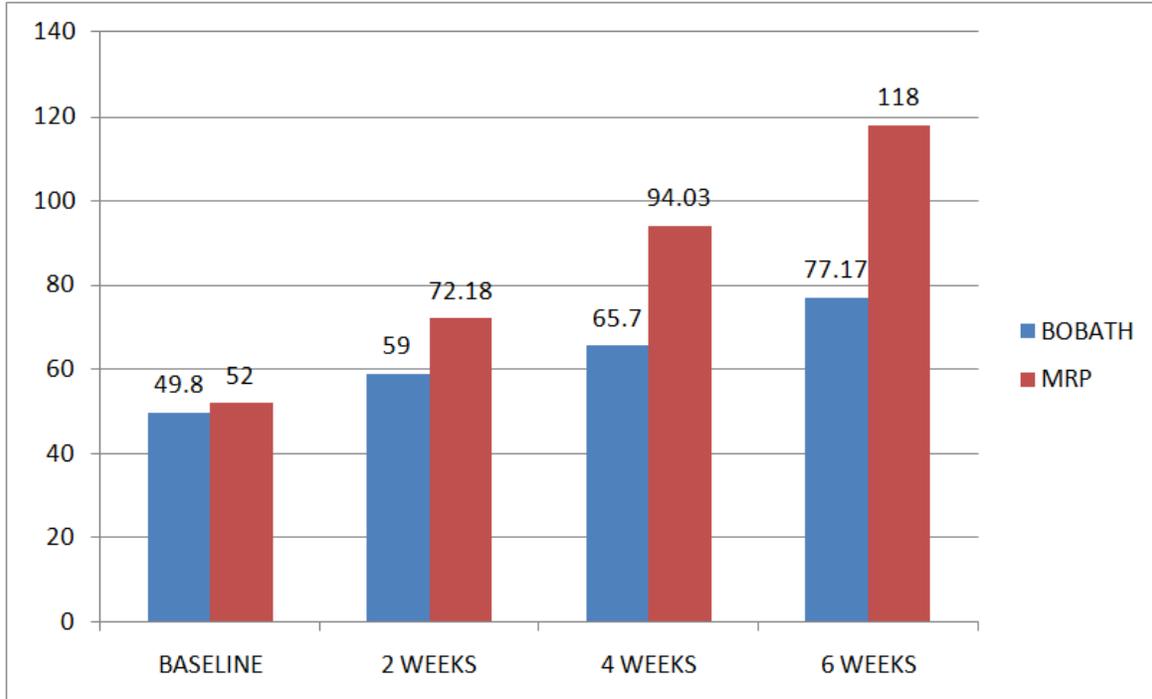
**Table1: Demographics: baseline characteristics, of our study participants**

	<b>MRP (n=17) Mean (SD)</b>	<b>Bobath (n=15) Mean (SD)</b>	<b>p value</b>
<b>Barthel index</b>	21(8.3)	22 (6.72)	P > 0.05
<b>Functional Independence Measure</b>	52(6.17)	49.8(10.11)	P > 0.05
<b>Functional ambulation category</b>	0(0)	0(0)	-
<b>Dynamic gait index</b>	0	0	-

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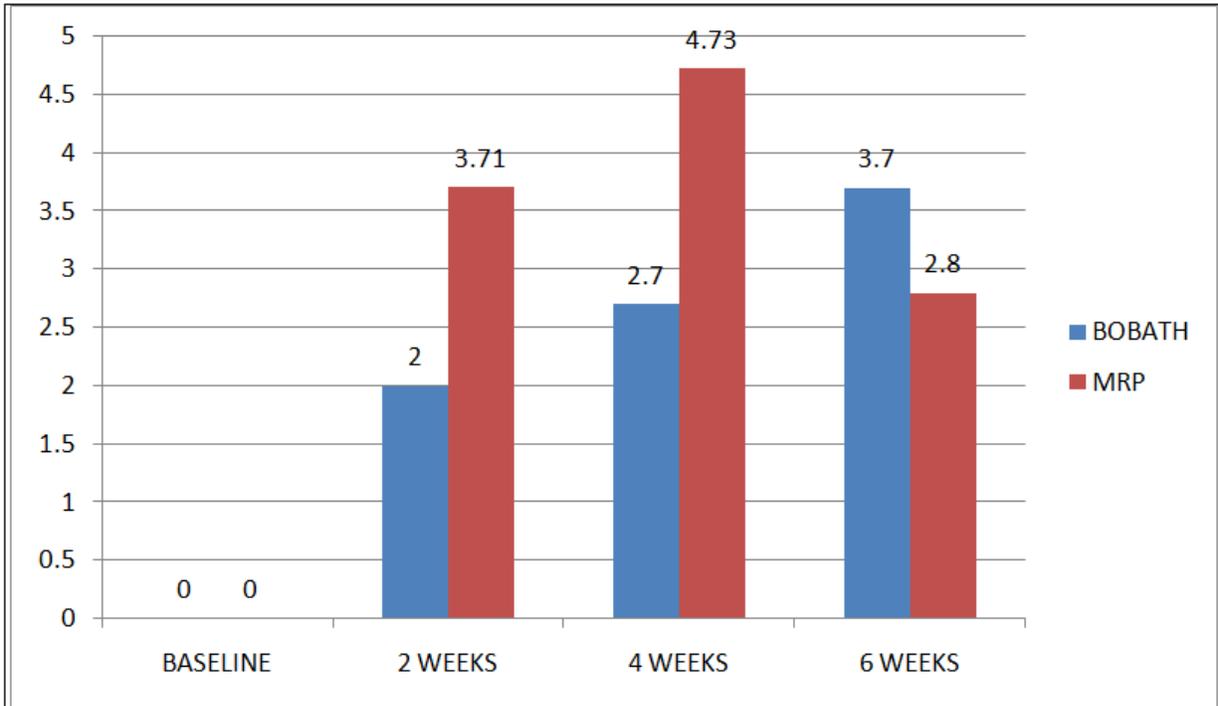


**Graph 1: Comparison of Bobath and MRP at every two weeks interval on Barthel index.**

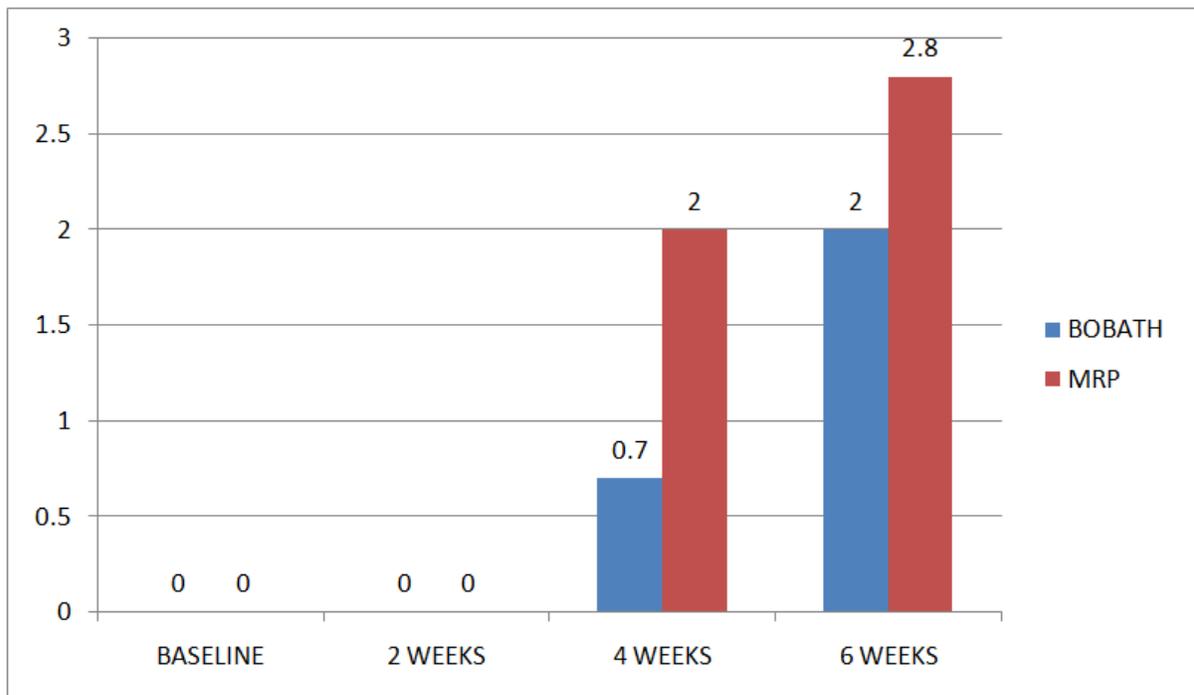


**Graph 2: Comparison of Bobath and MRP at every two weeks interval of Functional Independence Measures (FIM)**

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**Graph 3: Comparison of Bobath and MRP at every two weeks interval on functional ambulation category**



**Graph 4: Comparison of Bobath and MRP at every two weeks interval on Dynamic Gait Index**

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### **Discussion**

On Comparison of Bobath approach and motor relearning programme at intervals of 2 weeks showed that there was significant difference in two groups. MRP showed better improvement than Bobath approach on Barthel Index, Functional Independence Measure and Functional Ambulation Category at 2<sup>nd</sup>, 4<sup>th</sup> & 6<sup>th</sup> weeks and on dynamic gait index was shown only on 6<sup>th</sup> week.

These findings suggest that MRP is more effective in early enhancement of activities of daily living and ambulation starting at 2 weeks of treatment. Task specific training of MRP in initial phase of rehab helped in learning of the motor control and pattern of movement for specific activity and not just learning the non task specific movement and motor control of movement. This early improvement in MRP can be due to early intervention and introducing normal routine of daily life. This active participation and self reliance helped in motor learning of the pattern of movement, in a given context and task. Successful performance of functional activities requires interaction between person's abilities and environmental demands. MRP focuses on training task performance in an environmental context (Carr *et al.*, 1987; Johanne *et al.*, 2006). In Beverley French 2010 review of repetitive task training improve functional activity after stroke. Results showed that significant improvement in walking distance, walking speed, sit-to-stand and activities of daily living and borderline statistical significance for measures of walking ability, and global motor function. There were no statistically significant differences for hand/arm functional activity, lower limb functional activity scales, or sitting/ standing balance/reach. Repetitive task training resulted in modest improvement across a range of lower limb components, but not upper limb outcome measures. Training may be sufficient to have a small impact on activities of daily living.

At 4 weeks 70% of subjects in MRP group were able to walk independently on level surface (FAC grade 4-Patient can ambulate independently on level surfaces but requires supervision or physical assistance to negotiate any of the following: stairs, inclines or uneven surfaces) whereas not a single subject in the Bobath group had achieved this level of ambulation. After treatment of 6 weeks, only 50% subjects in Bobath group were able to achieve FAC score of 4 where as in MRP group 100% of subjects had achieved FAC score of 4 or above. Dynamic gait index showed significant improvement only at 6<sup>th</sup> weeks. Dynamic gait index involves multiple dynamic activities like, walking different speed, walking while turning head, walking over and around the obstacles, making quick turn's, stair climbing & descending. It also involves dual tasking and requires more balance. Development of these activities will take longer duration of training. This study shows there was just initiation of improvement in these activities. For good performance in these activity will requires long term training.

### **Conclusion**

Physiotherapy treatment using Motor Relearning program effective than BOBATH approach in early enhancement of Activities of Daily Living (ADL's) and ambulation when compared at every two week's interval in Acute Stroke Rehabilitation in first six weeks of training. Clinical significant- Thus MRP approach can be used in early phase of rehabilitation for improving activities of daily living and ambulation as it involves daily task specific activities, which are required for ADLs & thus it helps in getting good co-operation from patients. Limitation-study involves less sample size & included acute stroke patients. Further studies should be done with chronic patients and need to check the long term effect.

### **ACKNOWLEDGEMENT**

I take immense pleasure to express my sincere and deep sense of gratitude to Dr. Rachana Dabadghav & our Research department for constant support & guidance.

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