

Original Research Article

Modified Rood's approach and ability of independent selfcare in haemorrhagic stroke patients of Assam, India

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ABSTRACT

Background: Stroke is the third leading cause of death and the primary cause of serious, long-term disability which can be regarded as weakness, generalized fatigue, loss of voluntary motor control or limitation in mobility, spasticity, sensory and cognitive dysfunction. In this research, a comparative study on the ability of independent self-care was conducted between two groups of patients during a 3 months follow-up period viz. Group A - patients who were given Home Exercise Programme (HEP) with conventional physiotherapy; and Group B - patients who were given HEP with conventional physiotherapy along with neuro-facilitation via Rood's approach.

Methods: In this study 236 haemorrhagic stroke patients were recruited and randomly divided to two groups. Both the groups were given a HEP consisting of regular physiotherapy. Additionally, one group out of the two was also taught exercises based on Rood's approach consisting of facilitation and inhibition with the help of sensory stimulation, purposeful activity based exercises, with additional emphasis on repetition. The output was evaluated in terms of disability using the Barthel Index after 3 months of treatment.

Results: After 3 months, it was found that patients who received HEP with both conventional physiotherapy and Rood's approach had significantly greater improvement in Barthel Index scores compared to patients who received HEP only through conventional physiotherapy.

Conclusions: This suggests that HEP consisting of conventional physiotherapy along with Rood's approach is more effective in improving the ability of independent self-care in case of post intra-cerebral haemorrhagic patients when compared to conventional physiotherapy alone.

Keywords: Activity of daily living, Ability of independent selfcare, Intra-cerebral haemorrhage, Rood's approach, Stroke

INTRODUCTION

Stroke is the third leading cause of death and the principal cause of grave, long-term disability which can be regarded as weakness, generalized fatigue, loss of voluntary motor control or limitation in mobility, spasticity, sensory and cognitive dysfunction.¹ This drastically impacts performance of functional abilities, independent self-care and quality of life. Post stroke

disability is the most common disability where weakness is the primary impairment in individual which hinders their ability to carry out their activities of daily living.^{2,3}

According to Pollack and Disler, rehabilitation after stroke is a continuous process from the day of onset, and this begins from acute care hospital, outpatient rehabilitation clinic and lastly, at home. 75% of patients who survive the first month after a stroke will need

rehabilitation.⁴ The primary goal of rehabilitation is to assist stroke survivors to relearn skills that are lost due to brain damage. Stroke rehabilitation can help in regaining self-independence and improve the quality of life. This will maximize functional independence, minimize long-term disability and increase activities of daily living. Thus, stroke, which is often said to affect the patient as well as his/her family caregivers, is assuming epidemic proportions in developing countries such as India; an indicator of a significant burden, particularly in rural areas.⁵⁻⁷

Physiotherapy is an essential part of becoming active economically and participate in social life for most stroke survivors. Stroke rehabilitation is the only way to get motor and functional recovery. Various studies show the improvement and benefits from HEP in post stroke individuals.⁸⁻¹¹ The HEP is a tool to help patients assume responsibility for long term management of their disability which is not possible in an acute care hospital.

Rood's approach is based on known physiological facts that sensory stimulation provides desired muscular response and was specially designed for patients with motor control problem.¹²⁻¹³ It was developed by Margeret Rood in 1940.^{14,15} Rood's approach was based on four basic principles - (1) normalization of muscle tone using sensory stimulation, (2) ontogenic developmental pattern, (3) repetition and (4) purposeful movement. According to Rood, sensory stimulation can activate or deactivate the receptor by facilitation or inhibition, which makes it possible to get the desired muscular response.¹⁶⁻¹⁷ Sensory stimulation causes - (1) trophic change by axoplasmic flow in nerve processes over period of time as well as (2) immediate effect by transmission of nerve impulses.¹⁸ Rood clarified four types of receptors which can be stimulated to acquire desired muscular response - proprioceptive receptors, exteroceptive receptors, vestibular receptors and special sense organs. According to Rood, muscles have different duties, most of them are a combination, some predominant in light work or phasic and others in heavy work or tonic muscle. Rood categorized all flexors and adductors muscle groups as phasic or mobility muscle and all extensors and abductors are categorized as tonic or stability muscles.¹⁹ Facilitation or inhibition of proprioceptors, exteroceptors, vestibular and special sense organs can excite the anterior horn cell of spinal cord, which in turn will help normalize the muscular tone and motor recovery.^{20,21} Autonomic nervous system stimulation is also a vital part of Rood's approach which can stimulate the motor function of vital organs as well as the skeletal muscles.²² Different smell, music, vestibular mobilization, modulated color light can influence the autonomic nervous system which leads to improved consciousness.²³⁻²⁸ In this study, appropriate sensory stimuli, purposeful movement and repetition components of Rood's approach was employed in stimulating the cortical area and development of motor skill. According to earlier studies, somato sensory input to the motor cortex normally plays a vital role in learning

new motor skills and takes a crucial part in motor relearning after stroke hemiplegia.²⁹⁻³¹ However, ontogenic developmental sequence of Rood's approach is commonly believed as obsolete because studies show that the normal human development depends on perception, action, cognition, exploration, inherited tendencies and experience dependent learning.^{29,32-33} Studies showed that the developmental motor sequence was neither adhered habitually by developing children nor followed by adults when rising from supine to erect posture. Hence, in this research the ontogenic developmental sequence part of Rood's approach has been excluded.³⁴

The present study was conducted on the follow up patients of "hemiplegia" following stroke who came to the Neurology department of Gauhati Medical College and Hospital (GMCH), Assam (India). The patients were divided into two groups. One group was given HEP with Rood's approach (Group B) and while the other was given HEP without Rood's approach (control - Group A). The ultimate purpose of this study was to determine, the effect of incorporating Rood's approach in the HEP on the ability of independent self-care in case of post stroke individuals of Assam.

METHODS

A pre and post experimental study was done with a 3 months follow-up period at the Department of Neurology, Gauhati Medical College and Hospital (GMCH). From 12 May 2014 to 10 December 2017, 236 participants were recruited for the study and they were randomly divided into two groups whereby they were prescribed their quota of HEP (with and without Rood's approach). The ability of independent self-care of the patients was assessed in the first session and then reassessed by Barthel Index at the end of 3 months. The effectiveness of HEP upon incorporation of exercises based on Rood's approach in improving the ability of independent self-care of the patients was determined.

Patients were selected from GMCH depending upon the inclusion and exclusion criteria mentioned below.

Inclusion criteria

- Haemorrhagic stroke with supratentorial haematoma with hemiplegia,
- Muscle power: 0-3 muscle grade by manual muscle testing,
- Age: between 20-65 years.

Exclusion criteria

- Uncontrolled hypertension,
- Severe dysphasia or cognitive impairment.
- Demonstrated previous disability in self-care and the patient had been living in a nursing home prior to the stroke.

Intervention

All the patients and caretakers (both Group A and B) were instructed to follow a common HEP which included range of motion exercises, strengthening, stretching, weight bearing, balance and coordination exercises. Additionally, Group B was taught exercises based on the Rood’s approach which included facilitation and inhibition with the help of exteroceptive stimulation, proprioceptive stimulation, vestibular stimulation, and repetitive purposeful activity. For facilitation quick stretch, resistance, tapping, quick icing, fast brushing, light touch, traction, approximation, heavy joint compression has given. On the other hand for inhibition prolonged stretch, inhibitory tendon pressure, prolonged ice, slow rolling, rocking has given.

Along with the stimulation, patients were advised to do some repetitive purposeful activity; such as

- For the upper limb - wipe the table 5 minutes, grasp a glass and try to open it, touch a wall at the shoulder level and touch his/her cheek, touch hair, and slide a ball with the help of extensor aspect of forearm.
- For lower limb - sitting to standing with support, kick a ball, standing to half sitting, walk with support.

Statistical analysis

The data were analyzed by the statistical software SPSS 20.0. The data of manual muscle testing was analyzed using paired t-test and independent t-test. The level of significance set for this study was 95% (p <0.05). The relevant test statistic, t, is calculated from the sample data and then compared with its probable values based on t-distribution at <0.05 level of significance for concerning degrees of freedom in order to accept or reject the null hypothesis.

RESULTS

Out of the 236 patients, completely study was conducted for 198 patients while 38 patients were lost/missing/did not turn up during follow up. A detail of the patients recruited is provided in (Table 1).

Table 1: Gross and net patients followed up during the study.

No. of patients n (%)	Time for follow up assessment	No. of missing patients during follow up n (%)	No. of patients with complete follow up n (%)
236 (100)	After 3 months	38 (16.1)	198 (83.9)

To evaluate the effectiveness of HEP with and without Rood’s approach on the ability of independent self-care using Barthel scale, the data were analyzed in three phases. i.e. comparative analysis was conducted in three phases - analysis on the score of ability of independent self-care on the first day between two groups (Table 2), comparison between the ability of independent self-care on the first day and 3 months after treatment (Table 3), and lastly, comparative analysis on the score of ability of independent self-care 3 months after treatment between two groups (Table 4).

Table 2: Pretest comparison of ability of independent selfcare in two groups.

Evaluation day	Mean	SD	t value	p value
Group A	8.180	11.743	0.196	0.845
Group B	7.880	11.536		

Table 2 presents the data on the score of ability of independent self-care on the first day between Groups A and B. It was observed that the mean pre-treatment score of ability of independent self-care in Group A is 8.180±11.743 and in Group B is 7.880±11.536 (Table 2). Moreover, it was also found out that there was no significant difference in the pre-treatment of ability of independent self-care in both groups (p>0.05).

Table 3: Pretest and posttest comparison of ability of independent selfcare in two groups.

Group	Evaluation	Mean	SD	t value	p value
Group A	Pre-test	8.570	12.435	13.328	0.000
	Post-test	37.450	21.386		
Group B	Pre-test	8.150	11.948	17.947	0.000
	Post-test	43.150	18.349		

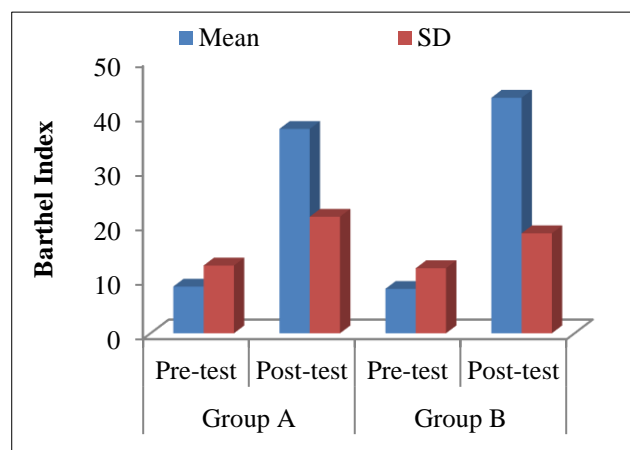


Figure 1: Pretest and posttest comparison of ability of independent selfcare in two groups.

Table 3 presents the comparative data on the ability of independent self-care on the first day and 3 months after

treatment for both groups. It was observed at the end of the study, that both groups demonstrated significant improvement ($p < 0.05$) in ability of independent self-care. Mean pre-treatment ability of independent self-care in Group A is 8.570 ± 12.435 and in Group B is 8.15 ± 11.947 whereas the mean of post-treatment ability of independent self-care in Group A is 37.450 ± 21.386 and in Group B is 43.150 ± 18.349 (Table 3).

Figure 1 shows a graphical interpretation of the pre and post-test comparative analysis of the ability of independent self-care between the two groups. Thus, the ability of independent self-care was found to be better for Group B.

Table 4: Posttest comparison of ability of independent selfcare in two groups.

Evaluation after 3 months	Mean	SD	t value	p value
Group A	37.450	21.386	2.014	0.045
Group B	43.150	18.349		

Table 4 presents the comparative data on the score of ability of independent self-care 3 months after treatment between the two groups. It was observed upon comparison between the two groups, Group B demonstrated significantly better effect than Group A on ability of independent self-care. The mean post-treatment ability of independent self-care in Group A is 37.450 ± 21.386 and in group B is 43.150 ± 18.349 (Table 4).

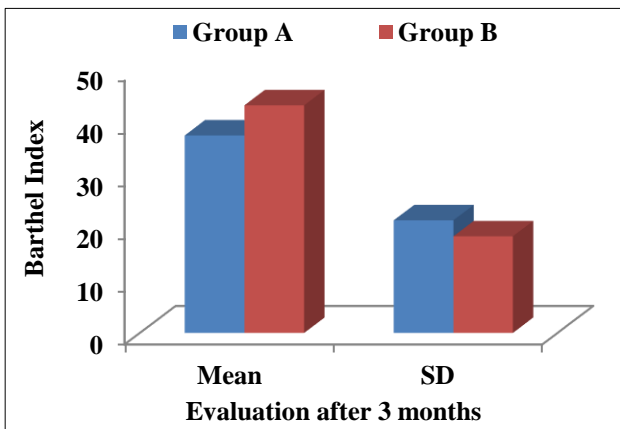


Figure 2: Posttest comparison of ability of independent selfcare in two groups.

Figure 2 shows a graphical interpretation of the post-test comparison of ability of independent self-care in two groups. It can be seen that the post-test mean value of Group B is higher than the Group A.

DISCUSSION

According to the results, it was observed that a significant difference exists between the two groups ($p < 0.05$) after 3

months of treatment. It was observed that Group B demonstrated significantly better effect than Group A on ability of independent self-care, inspite of the fact that the ability of independent self-care increased in both the groups after 3 months of treatment. Although literature of direct effects of Rood’s approach in enhancing the ability of independent self-care is limited; many other factors may be contributed towards the fact that Rood’s approach coupled with HEP showed significant improvement in the ability of self-care in case of post stroke individuals. There are various specific components associated with Rood’s approach which are usually given a lot of preference in conventional physiotherapy viz. proprioceptive, exteroceptive and vestibular stimulation, purposeful activity and repetition of movement. The proprioceptors stimulation and exteroceptive stimulation significantly improves motor recovery in post stroke patients; which leads to improved ability of independent self-care - a fact also reinforced by various other researches.^{34,35} This fact was also strengthened by the research of Ikuno et al, who found that somatosensory stimulation along with repetitive task specific activity helps to enhance the effects of task-oriented training in patients with subacute stroke.³⁶ Sim et al, also supported the fact that sensory stimulation is advantageous for improvement in the hand function of patients suffering from post-stroke hemiparesis and can help to improve independent self-care.³⁷ Moreover, various research works also showed that the practice of purposeful movements or activity based movement is an integral part of improving functional status.³⁸⁻⁴⁰ Apache found that rehabilitation through activity-based intervention provides a significant improvement in both locomotor and object control skills which in turn lead to an improvement in the ability of independent self-care.⁴¹ Studies have also shown that without repetition, it is difficult to gain motor recovery in motor disorder patients. Repetition is essential for learning a motor skill which can alter the cortical representation to reverse the detrimental changes due to a cortical lesion.⁴²⁻⁴⁴ Thus, it is imperative that incorporation of the three components of Rood’s approach in addition to conventional physiotherapy has led to significant improvement in the ability of independent selfcare in stroke patients of Assam.

There were few limitations in the study like, all the muscle groups were not evaluated, small sample size, Follow-ups after long time intervals. Shorter evaluation duration of 3 months only.

CONCLUSION

A comparative study on the effectiveness of HEP with and without Rood’s approach was conducted in order to determine the efficacy of Rood’s approach towards post stroke rehabilitation. It is observed that when compared with HEP alone, HEP coupled with neuro facilitation via Rood’s approach is significant in improving the ability of independent self-care. The three components of Rood’s

treatment may be the cause of this significant improvement viz. sensory stimulation, purposeful activity and repetition of movement. Facilitation or inhibition of proprioceptors, exteroceptors, and vestibular stimulation excited the cortical level and give motor recovery. Autonomic nervous system stimulation, another component of Rood's approach can also stimulate the motor activity of vital organs as well as the skeletal muscles. Thus, it is imperative that incorporation of the three components of Rood's approach in addition to conventional physiotherapy (HEP) has led to significant improvement in the ability of independent self-care in stroke patients of Assam.

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