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Comparison between rood inhibitory approach and bobath reflex inhibiting patterns to improve gross motor function and reduce spasticity in hemiplegic children of encephalitis

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Abstract---Objectives: To compare the effects of Rood Inhibitory approach and Bobath Reflex Inhibiting pattern to improve Gross motor Function and reduce spasticity in Hemiplegic Children of Encephalitis. Methods: A randomized clinical trial was conducted comprising of 22 patients recruited from different clinics of Faisalabad. Participants from both genders, in age range from 08-12 years were recruited and randomly allocated into two groups.

Treatment group A received Rood inhibitory approach and treatment group B received Bobath Reflex inhibiting pattern. Measurement of Modified Ashworth scale were recorded at pre-treatment and weekly for 4 weeks, while (GMFM-88 and GMFM- 66) was assessed at baseline and at end of 4th week. SPSS version 22 was used to analyze the data. Result: Mean age in Group A was 10.00 ± 1.673 years and in Group B was 9.82 ± 1.537 years. Total 11 were male and 11 were female. There was significant improvement in mean MAS score at 2nd week, 3rd week and 4th week post treatment readings (p value < 0.05). There was significant improvement in mean (GMFM-88 and GMFM- 66) at 4th week post treatment readings (p value < 0.05). Conclusion: Bobath reflex inhibiting pattern group was found to be more effective than Rood Inhibitory approach group in decreasing the spasticity and improving the gross motor functional movements in encephalitis children with hemiplegic spasticity.

Keywords---Rood Inhibitory approach, Bobath, Reflex Inhibitory pattern, Spasticity, Gross Motor Functional Movements, Encephalitis.

Introduction

Encephalitis is inflammation of brain caused by any viral or bacterial infection but in different researches cause of encephalitis is unknown. In 1938 sixty patients of Encephalitis were diagnosed with the symptoms of fever, vomiting, headache, drowsiness, body weakness, twitching, generalized convulsion, spasticity, bulging fontanel, Neck Stiffness Positive Babinski and Kerning sign. Absent abdominal reflexes and cyanosis. Tonic colonic Convulsion also present in these type of encephalitis children.^{1,2} Acute encephalitis occur due to acute inflammation of brain after 4 weeks and beyond patient of encephalitis present with spasticity and severe epilepsy than patient convert in chronic condition of encephalitis usually chronic condition is rare but in mostly cases patients develop with spastic encephalitis. Many Mental Retarded Children have spasticity, so many neurological physiotherapy approaches developed to reduce the spasticity. In Australian and Sweden Bobath and Rood approaches used to treat the spastic children and improve the functional movements through these approaches. Now in Pakistan Bobath (RIP) technique is applied for the reduction of spasticity and gain wonderful results.^{3,4} Reflex inhibitory patterns and postures (R.I.Ps) also called as Tone influencing patterns and postures (T.I.Ps) includes spasticity inhibitory positions or postures so the person can move his/her body parts by his/her own will. This technique makes the person independent in his/her daily activities. When the stimulation is given in inhibitory posture of the person then the chance of increase in spasticity decreases rapidly.^{5,6} Bobath technique used to treat the spastic encephalitis children through sustained stretching on calf and hamstring muscles develop the proper comfortable positions, using unstable surface with the use of visual input and vestibular impact for the treatment of balance, during treatment of encephalitis children therapist facilitate the patient through proper handling. Proprioceptive stimulus produce when therapist apply handling procedure. Traction and light joint compression apply to reduce the spasticity.⁷ Basically Rood (Inhibitory) Approach is generally accepted. This

Approach is use to homogenize the Muscle Tone, Correcting the body posture, Positioning and improve Gross Functional Movements. Actually it's a stretching and specialized method of handling.⁸ Spasticity is the most common manifestation of upper motor neuron lesion results in sensory motor control disorder. Spasticity is an increase of the reflex of passive muscle stretching, which alters movement speed, and shows up an involuntary muscular activation. Spasticity is sensorimotor dysfunction which causes functional limitations.^{9,10} This primary damage of central nervous system is associated with cognitive and sensory deficits but it can be shown as secondary impairments often in physical disabilities limiting the child to get explore him with environment. These problems are related to abnormal sensory-motor experiences.¹¹ Further to this, poor postural control and poor reactive balance control, late muscle activation resulted in top-down muscle contraction and restriction in completing task specific postural adjustments has been well recognized.¹² Comparing the effects of Rood (Inhibitory) approach and Bobath (Reflex Inhibiting pattern) to improve Gross motor Function and reduce spasticity in Hemiplegic Children of Encephalitis. Which intervention is more effective either Rood (Inhibitory approach) or RIP to reduce spasticity and Improve Gross Motor Functional Movements in hemiplegic children of Encephalitis?

Methodology

This single blinded RCT was performed during the time period of June 2021 to October 2021. The study protocol was approved from the Institutional Review Board of The University of Faisalabad. Study was conducted at Children Hospital Faisalabad and Gernal Hospital Ghulam Muhammad a bad, through the use of non-probability sampling technique of purposive type. Informed consent was taken from all research participants after explanation of research procedure to them. All subjects were asked about demographic data and medical history, and they underwent physical examination of the cervical and thoracic spines. Sample size of 30 was calculated with 15 subjects in each group by the use of formula.^{13,14} total sample size of 22 was taken with 11 in every group.

$$n = \frac{2SD^2 \left(Z_{\alpha/2} + Z_{\beta/2} \right)}{d^2}$$

*S.D= Standard deviation of the variable, d=significant effect size= difference between the mean values, $Z_{\alpha/2} = Z_{0.05/2} = 1.96$ (from Z table), $Z_{\beta} = Z_{0.20} = 0.842$ (from Z table) at 80% power. 22 children were randomized to one of two groups: Rood (n = 11) or Bobath (n = 11) by using lottery method. All participants were told not to share any information regarding their therapy with the other participants. The participants from both genders, age range from 08-12 years. The purpose of the study was to determine the Comparison between Rood inhibitory approach and Bobath reflex inhibiting pattern to reduce spasticity and improve gross motor functional movements in hemiplegic children of encephalitis. To test the null hypothesis that there is no significance difference in the effects of Rood inhibitory approach and bobath reflex inhibiting pattern, inferential statistics was applied. Data was collected at 5 points that start from initial assessment at pre-treatment as baseline measure, 1st week post treatment, 2nd

week post treatment, 3rd week post treatment and 4th week post treatment for Modified Ashworth scale for both groups A and B. Data was collected at 2 points at pre-treatment as baseline measure and at 4th week post treatment for Gross motor functional classification system for both groups A and B.

After allocation to treatment Group A and B, level of spasticity was recorded using modified Ashworth Scale. GMFM-88 and GMFM-66 scale were also be used to record the improvement of Gross Motor Functional Movements. Measurement was also be recorded pretreatment. First reading was taken on baseline before treatment session. Each reading was taken after the treatment session of 15 days.^{15,16} Data were collected before treatment and after 2, 4 and 6 weeks of intervention. Infrared: On baseline for 15 mint for both groups.¹⁷

Rood (Inhibitory): Group A were receiving Rolling, Shaking, Slow joint compression, Maintain stretch for 30 mints in alternative days.¹⁸ Patient prone while the therapist provides a rhythmical, moving deep pressure over the dorsal distribution of the posterior rami of the spine; done from occipital to coccyx and alternated and should not exceed 3 minutes because it causes a rebound phenomenon.

Bobath(RIP): Group B were receive traction and light joint compression for 30 minutes on alternate days.^{19,20}

SPSS version 20 was used to analyze the data. Quantitative variables are presented in the form of mean \pm SD. Qualitative variables are shown in the form of frequency table and percentages. Frequency tables, pie charts, bar charts and Histogram are be used to show summary of group measurements measured over time. Skewness and kurtosis was checked by applying Shapiro-Wilk test to assess the normality of outcome measures before the application of parametric tests. Paired sample t-test and Repeated measure ANOVA was applied to measure within or intra-group differences. It was used to determine change of subjective as well as objective measurements in within group effectiveness. While, Independent sample t-test was applied to measure between or inter-group changes. It was used to detect comparative effectiveness of both groups on dependent variables. P value ≤ 0.05 was considered as significant. Other inferential statistic was calculated for numerical/ quantitative variable.

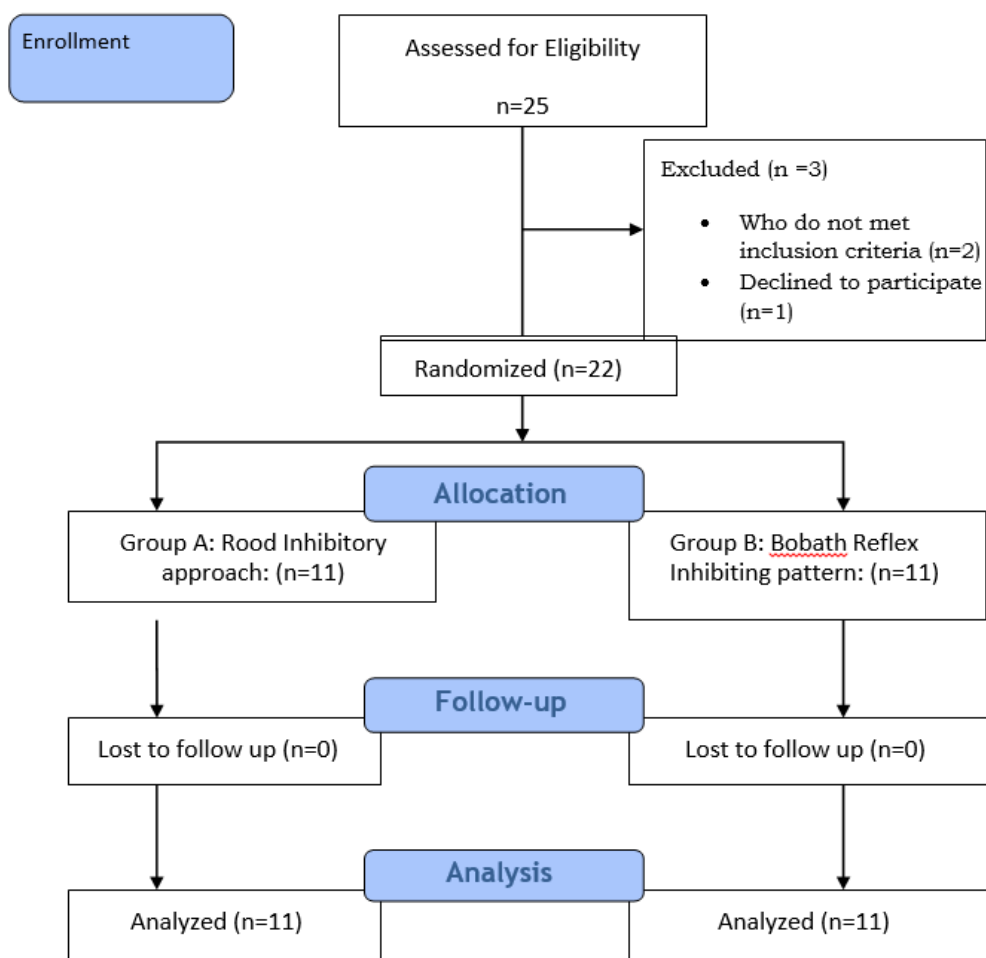


Figure I: Consort Flow Chart

Results

Table I: Baseline Demographics of the Study Sample Size (n= 22)

Parameters		Group A (Rood Inhibitory Approach)	Group B (Bobath Reflex Inhibiting Pattern)
Age of Patients (Mean ± SD)		10.00±1.673	9.82±1.537
Gender	Male (n=11) f (%)	4(36.36)	7 (63.64)
	Female (n=11) f (%)	7 (63.64)	4 (36.36)

Table 1 shows the demographic data of both groups in this study. Table demonstrates mean and standard deviation of age of group 1 and 2 being 10.00±1.673 and 9.82±1.537. There were total 22 participants in the study and 11 each group. Group 1 comprised of 4 (36.36%) males and 7 (63.64%) females, whereas group 2 contained 4 (36.36%) females and 7 (63.64%) males.

Table II: Test of Normality

		Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	df	Sig.
Modified Ashworth Scale	Group-1	.277	11	.018	.799	11	.060
	Group-2	.279	11	.017	.822	11	.018
Gross Motor Function Classification System Scale	Group-1	.164	11	.200	.943	11	.556
	Group-2	.226	11	.120	.924	11	.357

The above table represented the results of the normality tests for outcome measures in both groups. Data for both outcome measures in both groups was found to be normally distributed with p value > 0.05.

Table III: Within Group Analysis of Modified Ashworth Scale and Gross Motor Function Classification System Scale

Modified Ashworth Scale	Group 1 (Mean + S.D)	Group 2 (Mean + S.D)	p-value
Baseline	3.73+ .786	3.36+ .674	.258
1 st week	3.73+ .786	3.36+ .674	.258
2 nd week	3.73+ .786	2.36+ .674	.000
3 rd week	3.64+ .674	1.45+ .522	.000
4 th week	3.18+ .603	.64+ .505	.000
Gross Motor Function Classification System Scale	Group 1 (Mean + S.D)	Group 2 (Mean + S.D)	p-value
1 st Follow up	58.73+ 4.221	60.27+3.636	0.000
Last Follow up	60.45+3.671	88.73+5.658	0.000

Above table shows that there was significant improvement in mean MAS score with p value < 0.05 across all the treatment sessions.

Table IV: Between Group Analysis of Modified Ashworth Scale and Gross Motor Function Classification System Scale

Parameters		Group A (Rood Inhibitory Approach)	Group B (Bobath Reflex Inhibiting Pattern)	P-value
Modified Ashworth Scale	Baseline	3.73+ .786	3.36+ .674	.258
	1 st week	3.73+ .786	3.36+ .674	.258
	2 nd week	3.73+ .786	2.36+ .674	.000
	3 rd week	3.64+ .674	1.45+ .522	.000
	4 th week	3.18+ .603	.64+ .505	.000
Gross Motor Function Classification System Scale	1 st week	58.73+ 4.221	60.27+3.636	0.000
	Last week	60.45+3.671	88.73+5.658	0.000

Above table shows between group analysis at baseline, and last follow up of two different scales. P value also improve for between group analysis in last follow up compare to baseline for Group 1& Group 2.

Discussion

Current study demonstrates the comparison between Rood inhibitory approach and Bobath reflex inhibiting pattern to reduce spasticity and improve gross motor functional movements in hemiplegic children of encephalitis. In the present study, decrease in mean MAS and GMFCS scores was recorded in both groups. Significant improvement was observed in Bobath reflex inhibiting pattern group. According to Barba, et al. (2019) research was conducted to examine the effect of Bobath technique combination of muscle tension balanced PNF technique on lower limb spasticity in cerebral palsy children. Bobath technique control group demonstrated significant improvement in severity of muscle spasticity.²¹ Results of this study are found congruent with the findings of the current study. Another research was performed by Behzadi, et al. (2014) and Blundell, et al. (2018) to examine the effects of stretching and bobath reflex inhibiting pattern to reduce spasticity and improve daily living activities in spastic hemiplegic patients also show different result to current research ^{22,23}. The research by Bartlett, et al. (2019) and also differs from current research in the respect that it was conducted on lower limb spasticity ²⁴. A study was conducted by Alves, et al. (2020) to compare the effect of Bobath technique and Proprioceptive Neuromuscular Facilitation technique in improving function in cerebral palsy children.²⁵The results of this study are contrary to the findings of the present study. A case report was conducted by Curtis, et al. (2015) that 5 years old child of encephalitis was reported with the impairment of locomotion.²⁶ The result of this study was same. According to Granerod, et al. (2020) in another study 30 patients were assessed with mild to moderate spasticity and 4 to 7 year age. In this study those patients with hemiplegic spasticity, decrease tone, contractures and deformities were excluded.²⁷ The result of current study was same like current study.

The strength of current study was that study is replicable, it will give same results if repeated under same circumstances and situations. There was no clinical trial that had evaluated the comparison between rood inhibitory approach and bobath reflex inhibiting pattern to reduce spasticity and improve gross motor functional movements in hemiplegic children of encephalitis. This comparison was the discriminating feature of current study. The study was single blinded; patients were kept unaware of their respective group. The RCT was conducted on this particular topic because it was not briefly covered by any researcher till date. For the treatment of spasticity bobath (RIP) and Rood inhibiting approach is used for all the diseases except encephalitis so these techniques were used for treating spasticity in children with encephalitis. There were no dropouts. Subjects completed their follow-ups as the follow up duration was short.

Limitations

Study limitations were that no follow up was taken after the discontinuation of treatment to observe the maintenance of gained effects. It was a single blinded study, in which only patient was kept blind.

Recommendations for future researchers include larger sample size, triple blinded study, evaluation of more outcome measures and use of different treatment options alone or in combination to treat encephalitis children.

Conclusion

Current study concluded that both groups were found effective in improving Modified Ashworth Scale scores and Gross motor functional classification system scores. But, Bobath reflex inhibiting pattern Group with infrared was found to be more effective in decreasing the spasticity of hemiplegic children and improving the gross motor functional movements than the other 1st group of Rood inhibitory approach with infrared in encephalitis children with hemiplegic spasticity.

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