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# A Comparative Study on the Effectiveness of Rood's Approach Versus Combined Rood's Approach and Facial Proprioceptive Neuromuscular Facilitation (PNF) in Patients with Bell's Palsy

**SavitriYadav[1], Dr Deepak Lohar[2], Dr Jafar Khan[3], Dr.Rahat khan Warsi[4], Dr. Shubham Menria[5], Dr. Richa Hirendra Rai[6], Dr. Renuka pal[7]**

[1]Research Scholar MPT, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India

[2]Associate Professor, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India

[3] Dean And HOD, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India

[4]Assistant Professor Department of Pharmacology, Pacific Medical College & Hospital, Pacific Medical University, Udaipur, Rajasthan, Udaipur

[5]Assitant Professor, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India

[6] Professor, School of Physiotherapy, Delhi Pharmaceutical Sciences and Research University, New Delhi, India

[7]Associate Professor, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India

**Corresponding author:**
Savitri Yadav
Email ID : yadavsavi92@gmail.com

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**ABSTRACT**

**Background:**Bell's palsy is an acute idiopathic facial nerve paralysis that affects the seventh cranial nerve, causing sudden unilateral facial muscle weakness. While Rood's Approach and Facial Proprioceptive Neuromuscular Facilitation (PNF) are both recognized in physiotherapeutic management, there is limited evidence comparing their individual and combined effectiveness in facial palsy rehabilitation.

**Objective:**To compare the effects of Rood's Approach alone versus its combination with Facial PNF in improving facial muscle function in Bell's palsy patients using the House-Brackmann (HB) grading system.

**Methodology:** A comparative interventional study was conducted on 30 patients diagnosed with Bell's palsy. Participants were randomly divided into two groups: Group A received Rood's Approach alone, while Group B received Rood's Approach combined with Facial PNF. Interventions were provided over an 8-week period, and outcomes were assessed pre- and post-treatment using the HB grading system. Data were analyzed using paired and independent t-tests with significance set at $p < 0.05$.

**Results:** Both groups showed significant improvements post-treatment. Group A improved by a mean of 2.67 HB grade points, while Group B showed greater improvement with a mean change of 3.40. Although the between-group difference was not statistically significant, the clinical outcomes favored the combined approach, suggesting enhanced neuromuscular recovery.

**Conclusion:** Both interventions were effective in improving facial function in Bell's palsy patients. However, the combination of Rood's Approach with Facial PNF provided superior clinical benefits, supporting its recommendation as a more effective rehabilitation protocol.

**Keywords:** Bell's palsy, Facial PNF, Rood's Approach, House-Brackmann Grade, physiotherapy, facial paralysis rehabilitation...

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## 1. INTRODUCTION:

Bell's palsy is an idiopathic, acute-onset, unilateral facial nerve paralysis that affects the seventh cranial nerve and leads to sudden muscle weakness on one side of the face. The human face plays a vital role in personal identity and emotional expression; therefore, any defect in facial muscle control can result in psychological stress and social challenges. Bell's palsy is the most common cause of lower motor neuron facial paralysis, accounting for 60–75% of such cases globally, with an estimated 20–30 cases per 100,000 people annually in India. The exact cause is unknown, but it is strongly linked to viral infections, particularly herpes simplex, and is influenced by risk factors like diabetes, hypertension, migraines, and radiation exposure. The condition may result in partial or complete facial muscle weakness, often accompanied by numbness, altered taste, and increased sensitivity to sound.

Physiotherapy plays a critical role in the management of Bell's palsy by promoting muscle function and preventing complications like contractures and facial asymmetry. One such treatment is Rood's approach, developed by Margaret Rood, which uses sensory stimuli such as brushing, tapping, and joint compression to either stimulate flaccid muscles or inhibit spastic ones. It follows a developmental sequence and emphasizes repetition and functional movement. Another effective technique is Facial Proprioceptive Neuromuscular Facilitation (PNF), which applies diagonal movement patterns and proprioceptive cues to enhance voluntary control, coordination, and facial symmetry. Both techniques have demonstrated individual benefits in rehabilitation. However, combining these two methods may offer synergistic effects by targeting both the sensory and motor pathways, leading to improved facial function and faster recovery.

The need for this study arises from the gap in literature comparing the effectiveness of Rood's approach alone versus its combination with Facial PNF. While spontaneous recovery is possible in many cases, incomplete recovery and long-term dysfunction remain concerns, especially when rehabilitation is delayed. A comparative evaluation may help establish a more comprehensive, evidence-based protocol for clinical physiotherapy practice in Bell's palsy.

The aim of the study is to compare the effectiveness of Rood's approach alone with that of a combined intervention involving Rood's approach and Facial PNF. The objectives include assessing the individual impact of each method and statistically analyzing their comparative effectiveness. The alternate hypothesis states that there will be a significant difference in treatment outcomes between the two groups, whereas the null hypothesis suggests no significant difference. This research could potentially redefine rehabilitation standards and improve outcomes for patients with Bell's palsy.

## 2. METHODOLOGY

This study is designed as a **comparative interventional study** conducted in the **Department of Neurology at Pacific Medical University**. The research aims to evaluate and compare the effectiveness of two physiotherapeutic approaches in the rehabilitation of patients with Bell's palsy. A **purposive sampling technique** has been employed to select participants who meet the specific inclusion criteria. The **total sample size consists of 30 patients**, who are equally divided into two groups, with **15 patients in each group**.

The duration of the intervention is set for **6 weeks**, during which structured therapy sessions will be administered based on the group allocations. **Group A** will receive treatment exclusively using **Rood's Approach**, which focuses on sensory stimulation to normalize muscle tone and improve motor control. On the other hand, **Group B** will undergo a **combined therapy protocol involving both Rood's Approach and Facial Proprioceptive Neuromuscular Facilitation (PNF)**. This integrated approach is designed to enhance neuromuscular activation and coordination by utilizing both sensory and proprioceptive inputs.

By comparing the outcomes between the two groups, this study aims to determine whether the combined intervention yields superior clinical benefits in facial muscle function and recovery rate in patients with Bell's palsy. The findings of this research may help guide more effective, evidence-based rehabilitation strategies in neurological physiotherapy.

## 3. PROCEDURE

A total of 30 subjects meeting the inclusion criteria were recruited and randomly divided into two equal groups—Group A and Group B—each comprising 15 individuals. The intervention was administered over a period of 8 weeks, with sessions conducted six days per week, each lasting approximately 20 minutes under the supervision of a trained physiotherapist in a controlled clinical setting.

**Group A** received treatment based on **Rood's technique**, a sensory-motor approach that targets abnormal muscle tone through facilitation for hypotonic muscles and inhibition for spastic muscles. Patients were positioned either comfortably on a bench with head and neck support or in a high Fowler's position with the head maintained in midline to optimize sensory input. The physiotherapist maintained ergonomic positioning—either at the head end or side of the patient—depending on the muscles being targeted. Facilitation techniques included fast brushing, stroking, and icing over flaccid facial muscles like the frontalis and orbicularis oris, performed in 3–5 strokes per muscle and repeated thrice with short rest intervals. Inhibition techniques involved slow brushing, stroking, and prolonged icing over spastic muscles like the buccinator and platysma,

each stroke lasting about 10 seconds and performed in three repetitions per session to reduce hypertonicity.

**Group B** received the same Rood's technique as Group A, with the addition of **Facial Proprioceptive Neuromuscular Facilitation (PNF)** to enhance neuromuscular coordination and strength. Patients were treated in a high Fowler's position, with the physiotherapist positioned directly in front of them to apply tactile resistance during guided facial movements. The PNF protocol targeted specific facial muscles using manual resistance to elicit functional expressions like eyebrow raising, frowning, eye closure, lip pursing, and smiling. Each movement was performed for three sets of 10 repetitions, with each contraction held for 5 seconds and adequate rest intervals between sets to prevent fatigue.

**Home exercise programs** were also prescribed for both groups. All patients were advised to practice facial expressions during daily activities using a mirror for self-feedback and to maintain proper facial hygiene. Group A was instructed to use cold stimulation on flaccid areas and warm compresses on spastic regions as part of their home care. In contrast, Group B was guided to continue selected facial PNF exercises—such as smiling and lip pursing—at home under mirror supervision, with two sets of 10 repetitions daily. They were also advised to avoid excessive jaw strain and maintain a logbook to monitor home exercise adherence, which was reviewed during follow-up sessions.

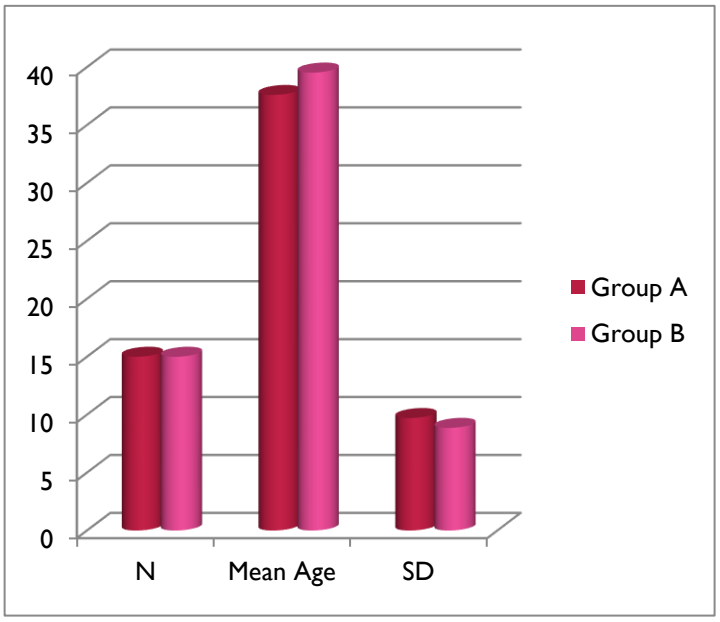
## 4. STATISTICAL ANALYSIS AND RESULTS

The data from both groups were statistically analyzed using paired and independent t-tests. House-Brackmann (HB) scores were assessed pre- and post-intervention to evaluate treatment effectiveness. Demographic variables (age) were also recorded. A p-value $< 0.05$ was considered statistically significant.

**Table 1: Demographic Summary**

| Group | N | Mean Age | SD |
|---|---|---|---|
| Group A | 15 | 37.6 | 9.71 |
| Group B | 15 | 39.53 | 8.86 |

**Table : Combined Table: Pre- and Post-Test Comparison (House-Brackmann Grade Scores)**



| Group | N | Pre-Test Mean ± SD | Post-Test Mean ± SD | Mean Difference | t-value | p-value |
|---|---|---|---|---|---|---|
| Group A | 15 | 4.73 ± 0.70 (HB Grade) | 2.07 ± 0.88 (HB Grade) | 2.67 | 8.36 | < 0.005 |
| Group B | 15 | 4.93 ± 0.80 (HB Grade) | 1.53 ± 0.74 (HB Grade) | 3.4 | 13.36 | < 0.005 |
| A vs B (Pre) | - | 4.73 vs 4.93 (HB Grade) | - | 0.2 | -0.73 | > 0.005 |
| A vs B (Post) | - | - | 2.07 vs 1.53 (HB Grade) | 0.53 | 1.78 | > 0.005 |

## 5. RESULTS:

There is Significantly higher proportion of cases had subtle or obvious shoulder flexion/abduction at the affected side compared to the unaffected side.

## 6. DISCUSSION:

The present study was undertaken to compare the effects of Rood's Approach alone (Group A) with the combined approach of Rood's and Facial Proprioceptive Neuromuscular Facilitation (PNF) (Group B) in patients diagnosed with facial palsy. The House-Brackmann (HB) grading system was used as the primary outcome measure to evaluate facial nerve function. The demographic characteristics of both groups, including mean age and standard deviation, were found to be comparable, suggesting that the population was well matched and eliminating age as a potential confounding factor in treatment outcomes. Furthermore, the pre-intervention HB scores were statistically similar between the two groups (Group A: 4.73 ± 0.70, Group B: 4.93 ± 0.80), confirming that both groups started with similar severity levels of facial nerve involvement, which adds validity to the comparative analysis.

Following the 8-week intervention period, significant within-group improvements were observed in both groups. Group A, treated solely with Rood's Approach, showed a notable reduction in HB grade scores, with a mean improvement of 2.67 points, indicating that sensory-based facilitation and inhibition techniques were effective in promoting recovery of facial muscle control. This supports existing literature that emphasizes the importance of sensory input in neuromuscular re-education. However, Group B, which received the same Rood's techniques along with additional PNF-based exercises, demonstrated an even greater mean improvement of 3.40 points. Although the difference in post-treatment outcomes between the two groups was not statistically significant ($p > 0.05$), the magnitude of improvement in Group B was clinically relevant and suggests enhanced neuromuscular engagement due to the inclusion of PNF techniques.

PNF facilitates muscle activity through proprioceptive input, resistance, and movement patterns that mimic natural facial expressions. This active participation likely contributed to improved motor recruitment and coordination in Group B. Unlike Rood's passive sensory approach, PNF encourages voluntary effort, which is crucial for retraining facial muscles affected by paralysis. The results of this study suggest that while Rood's Approach alone is effective, the combination with PNF provides additional benefits in terms of faster recovery, improved symmetry, and more functional muscle control.

Though the statistical difference between groups did not reach significance, the clinical outcomes favor the combined approach. In real-world rehabilitation settings, especially where the quality of life, facial aesthetics, and patient satisfaction are considered important, this additional improvement can be meaningful. Therefore, the findings highlight the potential of integrating Rood's sensory methods with motor facilitation techniques like PNF for a more comprehensive and effective rehabilitation protocol in patients with Bell's palsy.

## CONCLUSION& CLINICAL IMPLICATION :

This study concludes that both Rood's Approach alone and the combined approach of Rood's with Facial Proprioceptive Neuromuscular Facilitation (PNF) significantly improved facial muscle function in patients with Bell's palsy. While both interventions were effective, the combined therapy demonstrated greater clinical improvement, suggesting that integrating sensory stimulation with active motor facilitation offers enhanced rehabilitation outcomes.

## SCOPE & LIMITATION:

This study had several limitations, including a small sample size of only 30 participants and a short intervention duration, which may not capture long-term effects. The use of a single outcome measure (House-Brackmann Grade) limited the assessment of comprehensive recovery, and factors such as gender distribution, side of facial involvement, and differentiation between acute and chronic cases were not considered. Future studies should aim for a larger sample size with extended follow-up periods and incorporate multiple outcome measures such as EMG, facial symmetry assessments, and quality of life scales. Additionally, separating acute from chronic cases and exploring other physiotherapy techniques like mirror therapy, biofeedback, or electrical stimulation may provide broader insights. Including patient-reported outcomes and satisfaction levels could further enhance the real-world relevance of the findings

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