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Original Research Paper

Occupational Therapy

EFFICACY OF EARLY GRADED PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION AS COMPARED TO CONVENTIONAL OCCUPATIONAL THERAPY IN PATIENTS WITH FACIAL NERVE PALSY: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Background: Facial nerve palsy significantly affects facial symmetry, expression, and function, impacting the quality of life. While conventional Occupational Therapy (OT) is commonly employed for facial rehabilitation, the potential benefits of an early graded Proprioceptive Neuromuscular Facilitation (PNF) approach remain underexplored. **Objective:** This randomized controlled trial (RCT) aimed to evaluate the efficacy of an early graded PNF program in comparison to conventional OT in improving facial motor recovery in patients with facial nerve palsy. **Methods:** A total of 60 patients with unilateral facial nerve palsy (minimum 3 days of onset & onwards) were randomly allocated into two groups by using block randomization; the OT group (n=27) received standard facial OT interventions and the PNF group (n=27) received a structured, progressive PNF program targeting facial musculature, both groups underwent therapy for 8 weeks, 3 sessions per week. Outcome measures included the House-Brackmann Facial Nerve Grading System (HB), Sunnybrook Facial Grading System (SFGS), and Facial Disability Index (FDI), assessed at baseline, 4 weeks, and post-intervention (8 weeks). **Results:** The PNF group demonstrated significantly greater improvement in SFGS and FDI score as compared to the OT group at 4 and 8 weeks ($p<0.05$), reflecting enhanced functional recovery and patient-reported quality of life. **Conclusion:** Early graded PNF appears to be more effective than conventional OT in promoting facial muscle re-education and functional recovery in patients with facial nerve palsy. Incorporating PNF into early rehabilitation protocols may yield superior outcomes in facial motor function.

KEYWORDS : Facial nerve palsy, Proprioceptive Neuromuscular Facilitation, Occupational Therapy, Facial rehabilitation, RCT, Early intervention & Kabat technique.

INTRODUCTION

Facial nerve palsy, also known as facial paralysis, is a condition resulting from inflammation or damage to the facial nerve (cranial nerve VII), leading to partial or complete loss of voluntary facial movements. From an anatomical perspective, the facial nerve begins in the brainstem, travels through the facial canal in the temporal bone, leaves through the stylomastoid foramen, and then branches inside the parotid gland. The face structures receive sensory, motor, and parasympathetic innervation from these terminal branches. [1] This nerve plays a critical role in controlling facial muscles, and its dysfunction may manifest as the inability to move the lips, incomplete eye closure, impaired forehead movement, drooping of the mouth, facial asymmetry, and synkinesis an involuntary movement accompanying voluntary muscle activity. [2,3]

Among various aetiologies, Bell's palsy is the most common idiopathic form, accounting for approximately 70% of unilateral peripheral facial palsy cases. [4,5] Bell's palsy affects 11 to 40 people worldwide each year, with estimates in India being between 20 and 30 cases per 100,000. Though often self-limiting, Bell's palsy can result in long-term sequelae such as synkinesis, especially in the absence of timely physical rehabilitation.[2]

Facial nerve palsy is of particular concern in neurosurgical and otolaryngological (ENT) practice, where both idiopathic and post-operative presentations are commonly encountered. [6,7]

Given the facial nerve's essential role in emotional expression and social interaction, its impairment can severely affect a patient's psychosocial well-being and overall quality of life. [6] Traditional rehabilitation strategies include facial massage, mirror feedback exercises, splint-assisted movements, electrical stimulation, and mime therapy. [8-12] However, the clinical outcomes of these interventions can vary significantly.

Proprioceptive Neuromuscular Facilitation (PNF), specifically the Kabat rehabilitation approach, has emerged as a promising method in neurological rehabilitation. Developed by Dr. Herman Kabat and Margaret Knott in the 1940s, PNF is a technique aimed at enhancing neuromuscular control and improving muscular elasticity through a combination of proprioceptive stimuli, traction, and resistance-based manoeuvres. [13] Based on neurophysiological principles such as irradiation, successive induction, and reciprocal innervation, this method aims to reestablish normal neuromotor pathways.

In the context of facial rehabilitation, Kabat's method involves stimulating three anatomical fulcra-upper, intermediate, and lower-through targeted traction and pressure to activate specific facial muscle groups. [14] Since its first documented use for facial rehabilitation in Italy in 2003, this technique has gained traction in countries including Switzerland, Egypt, Nepal, Iran, and Pakistan. [14-21] In India, however, only a limited number of studies have explored its application, with research emerging from regions like Chennai and Punjab since 2018. [22-24]

Given the limited yet promising evidence, the present study aims to evaluate the effectiveness of a graded Proprioceptive Neuromuscular Facilitation (PNF) protocol in comparison to conventional occupational therapy for the rehabilitation of patients with facial nerve palsy in India. This research seeks to contribute to the growing body of literature by validating the clinical utility of the Kabat approach in an Indian clinical context.

AIM:

To find the efficacy of early graded PNF Program as compared to Conventional Occupational Therapy in Facial Nerve Palsy.

OBJECTIVES:

Primary objective- To compare the effectiveness of Conventional Occupational Therapy and Early graded Proprioceptive neuromuscular facilitation program in patients with Facial nerve palsy.

Secondary Objectives-

I. To find out the effectiveness of conventional occupational therapy' and 'early graded PNF program on degree of nerve

damage using House Brackmann Facial Nerve Grading Scale.
II. To find out the effectiveness of 'conventional occupational therapy and 'early graded PNF program on facial movement outcome using Sunnybrook Facial Nerve Grading Scale.
III. To find out the effectiveness of "conventional occupational therapy' and 'early
graded PNF program' on facial disability using Facial Disability Index

MATERIALS & METHODS

Ethical approval: The study protocol, informed consent form, and case record form were reviewed and approved by an institutional ethics committee. The study was initiated after receiving the approval from the institutional ethics committee. The study ethics approval number is ICC/331/22. A prospective, .interventional, single blinded and a randomized controlled trial.

The study was conducted in tertiary care hospital in Mumbai, Maharashtra, India.

Study Tools:

House-Brackmann Facial Nerve Grading System (HBFGS)

The House-Brackmann Facial Nerve Grading System (HBFGS) is the standard and widely accepted method for evaluating facial nerve function. First introduced by House and Brackmann in 1983 and subsequently endorsed by the Facial Nerve Disorders Committee of the American Academy of Otolaryngology in 1984, the HBFGS remains the most reliable and universally recommended tool for assessing the severity and progression of facial palsy.[25] This scale is designed to provide a comprehensive yet easily administered assessment of facial muscle function, making it a valuable tool for both clinical monitoring and research purposes.

The HBFGS consists of six grades, ranging from Grade I (normal function) to Grade VI (complete paralysis). The interpretation of each grade is as follows:

Grade I – Normal function to Grade VI – Total paralysis
The system demonstrates high reliability metrics, with inter-rater reliability exceeding 0.80, intra-rater reliability ranging from 0.85 to 0.86, and inter-observer reliability reaching 0.96. The grading assessment typically takes only 2–3 minutes to administer, making it both efficient and practical for repeated use in clinical settings. [25]

Sunnybrook Facial Grading System (SBFGS)
The Sunnybrook Facial Grading System (SBFGS) is a detailed and quantitative tool developed in 1992 at the Sunnybrook Health Sciences Centre in Toronto for assessing facial nerve function in patients with facial palsy. [26] Unlike simpler grading systems, the SBFGS evaluates three distinct components of facial function: resting facial symmetry, voluntary muscle movement, and the presence and extent of synkinesis (involuntary movement accompanying voluntary action). This comprehensive approach provides a more nuanced evaluation of facial nerve recovery and dysfunction.

The SBFGS demonstrates strong psychometric properties, with inter-rater reliability ranging from 0.85 to 0.97 and intra-rater reliability between 0.97 and 0.99. It also shows a strong positive correlation with the House-Brackmann Grading System, further validating its use as a complementary or alternative assessment tool in clinical and research settings.[26]

The system generates a composite score ranging from 0 (complete facial paralysis) to 100 (normal facial function), where higher scores indicate better recovery.

While more comprehensive, administration of the SBFGS typically requires 10–15 minutes, making it slightly more time-consuming than the House-Brackmann scale, but offering greater diagnostic detail.

Facial Disability Index (FDI)

The Facial Disability Index (FDI) is a patient-reported outcome measure designed to assess the functional and psychosocial impact of facial nerve disorders. It was developed by Dr. Jessie VanSwearingen and Dr. Jennifer Brach to quantify the degree of disability experienced by individuals with facial palsy, providing a holistic view of both physical and social functioning. [27]

The FDI consists of 10 items, divided into two subscales:
Physical Function Subscale (Items 1–5): Assesses domains such as facial movement, oral function, eye comfort, and lacrimal control.

Social/Well-being Subscale (Items 6–10): Evaluates aspects related to facial comfort and social interaction.

Each item is rated on a 6-point Likert scale, with responses indicating levels of difficulty or impairment:
Physical Function items are scored from 5 (no difficulty) to 0 (severe difficulty).

Social/Well-being items are scored from 6 (no function affected) to 1 (severe function affected).

Scoring is standardized on a 100-point scale, where higher scores indicate better function:
The FDI has been validated for use in clinical studies, demonstrating strong reliability with a theta reliability coefficient of 0.88 for the physical function subscale and 0.83 for the social/well-being subscale. [27] The typical time required to complete the FDI is 10–15 minutes.

When used in conjunction with clinician-administered scales such as the House-Brackmann and Sunnybrook systems, the FDI offers a valuable patient-centred perspective. The total time required to administer all three assessment tools (HBFGS, SBFGS, and FDI) is approximately 20–25 minutes.

Subjects willing to participate were recruited from Outpatient Department (OPD) of OT Department. Patients coming with confirmed diagnosis and referred to OT Department were screened for the study and with consent, they were recruited.

Inclusion Criteria:

Bell's palsy from ENT OPD, Facial nerve palsy from ENT and Neurosurgery IPD.
Lower motor neuron facial nerve palsy (LMN)
Age 15-60 years
Acute onset, first episode, minimum 3 days post onset
House Brackmann Facial Nerve Grading System score 3 or more

Exclusion Criteria:

Facial nerve palsy secondary to trauma to face and surrounding areas
Comorbidities/ affected with any other neurodegenerative disease or autoimmune disease
Stroke
Other cranial nerve involvement

Sample size:

Considering the effect size of 0.8, alpha error of 0.05, power of the study as 80%, the sample size estimated was 26 patients per group. By considering 10% dropouts, the sample size was fixed at 30 patients per group.

Patients coming with confirmed diagnosis from ENT OPD

(Bell's palsy) & from Neurosurgery IPD (Facial nerve palsy) are referred to OT Department were screened for the study and with consent, they were recruited.

A total of 60 individuals were divided into two groups through Block randomization method (it works by randomizing participants within blocks such that an equal number assigned to each treatment, a block of 6 participants at a time also block randomization will be done by cause wise).

Group A will receive Conventional Occupational Therapy and Group B will receive Early graded proprioceptive neuromuscular facilitation program.

Facial splint was the baseline splint for both the groups.

Both treatments were given for 3 days/week, 45 minutes session for 8 weeks.

House Brackmann Facial Nerve Grading System (HBFNGS), Sunnybrook Facial Grading Scale (SFGS) and Facial Disability Index (FDI) were used as outcome measure tool.

Measurement was taken at the baseline, after 4 weeks and 8 weeks of the intervention.

Splint for facial paralysis: In treating any paralyzed portion of the body every effort is made to maintain maximum function. To accomplish this, emphasis is placed on proper position, keeping up muscle ton, and maintaining adequate circulation. Developed a malleable hook splint for use in the treatment of facial paralysis.[28]

Fig 1. Facial splint

Material and measurement: The appliance will be made up of high temperature thermoplastic, approximately 10-12cm length and 1cm width which is adjustable and can be remoulded according to the need of the patient. Moulding is done by using heat gun/gas stove. Thermoplastic bent to form a loop which encircles the ear pinna and the opposite end is moulded in the form of hook which will lift the angle of the mouth. Splint will be given within first 3 days.[28]

Wearing regimen- patient will were the splint throughout the day with intermittent breaks of every 2 hour, it should be cleaned with normal water and towel dry before each application. Splint need to be removed while eating, sleeping and exercising. Splint is continued during full intervention period.

INTERVENTION PROTOCOL

Group A will receive Conventional Occupational Therapy which is as follows:

WEEK 1-8	CONVENTIONAL OCCUPATIONAL THERAPY	FREQUENCY/ DURATION
WEEK 1-2 All the exercises will be done in front of mirror Patient will sit in front of the mirror on a resting arm chair; therapist will stand just behind the patient also facing to the mirror	1. Raising eyebrow and look surprised 2. frowning 3. close eyes and wide open 4. flaring the nose (difficult in early phase so take the help of breathing later flare) 5. smiling 6. open and shut your jaw 7. move your jaw side to side 8. blow air from mouth 9. clench the teeth strongly and say 'EE` 10. push your tongue forward and backward 11. move the lower lip downward	3 sets of 5 repetition for 5 counts once/day, 45-minute session
WEEK 3-4 All the exercises will be done in front of mirror Patient will sit in front of the mirror on a resting arm chair; therapist will stand just behind the patient also facing to the mirror	Previous 11 exercises of week 1 continues in addition to the following exercise 12. Close your eyes tightly and wide open 13. touch the tip of the tongue to the bottom of teeth 14. touch the tip of the tongue to the corner of the mouth 15. rotate tip of the tongue to the cheeks (clock and anti-clock wise)	3 sets of 5 repetition for 5 counts once/day, 45-minute session
WEEK 5-6 All the exercises will be done in front of mirror Patient will sit in front of the mirror on a resting arm chair; therapist will stand just behind the patient also facing to the mirror	Previous 15 exercises of above weeks continue in addition to the following exercises 16. sucking cheeks between the teeth 17. making sustained 'ff' sound and pronouncing vowels (a, e, I, o) and constants (p, b)	3 sets of 5 repetition for 5 counts once/day, 45-minute session
WEEK 7-8 Previous 15 exercises of week 2 continues in addition to the following exercises 16. sucking cheeks between the teeth 17. making sustained 'fff' sound and pronouncing vowels (a, e, I, o) and constants (p, b)	Previous 17 exercises of above weeks continue in addition to the following exercises 18. blowing paper of different thickness at various distance 19. sucking water or air using straws of thin/small diameter and length	3 sets of 5 repetition for 5 counts once/day, 45-minute session

WEEK 1-2

Fig. 2 Facial splint Bell's palsy grade 3 According to House Brachmann Scale

Fig. 3 Raising eyebrows

Fig. 4 Frowning

Fig. 5 Eyes closed and wide open

Fig. 6 Flair the nose

Fig. 7 Smiling

Fig. 8 Open and shut jaw

Fig.9 Move jaw side to side

Fig.10 Blow air

Fig. 11 Stronge teeth Clench & EEE

Fig. 12 Push the tongue forward and backward

Fig. 13 Move the lower lip downward

WEEK 3-4

Fig. 14 Close eyes tightly & wide open]

Fig. 15 Tip of the tongue to the bottom of the teeth

Fig. 16 Tip of the tongue to the corner of the mouth

Fig. 17 Rotate the tongue clock & anti-clock wise

WEEK 5-6

Fig. 18 Suck cheeks

Fig. 19 Making sustained fff or vowels (a, e, I, o , u)

Fig. 20 Blowing paper of different thickness at different distance

Fig. 21 Sucking water using straw

Fig. 22 All the exercises were performed in front of mirror

Group B will receive Early graded PNF program which is as follows:

WEEK 1-8	EARLY GRADED PNF EXERCISES	FREQUENCY/ DURATION
WEEK 1-2 Normal side- Active movement Affected Side-Passive Patient will sit in front of the mirror on a resting arm chair; therapist will stand just behind the patient also facing to the mirror	All the exercises done by therapist 1. pull eyebrow up (as in raising eyebrow) 2. pull eyebrow down (frown) 3. close eye (assistance on upper eyelid closure) 4. close eye (assistance on lower eyelid closure) 5. pushing nose upward (flaring) 6. pull angle of mouth upward (smiling) 7. pull angle of mouth outward (showing teeth) 8. pull lower lip down 9. pull the lip together (pucker) 10. pushing out inner surface of cheek out with gloved finger/ damped tongue blade or ice cream stick	3 sets of 5 repetition for 5 counts once/day, 45-minute session
WEEK 3-4 Normal Side-Resisting full movement Affected Side- Assisted movement Patient will sit in front of the mirror on a arm resting chair, therapist will stand just behind the patient also facing to the mirror	Therapist resisting normal side not allowing to happen full movement on normal side, simultaneously assisting affected side 1. lift the eyebrow up and look surprised 2. frown and pull eyebrow down 3. close your eyes tight and open (assistance on upper eyelid) 4. close your eyes tight and open (assistance on lower eyelid) 5. wrinkle your nose 6. smile without opening the mouth 7. purse the lip as in whistling 8. lift the angle of mouth outward (as in showing teeth) 9. lower the lower lip 10. with the head upright, open the mouth wide 11. suck the cheek in 12. stick the tongue upward to try to touch the tip to the nose 13. stick the tongue downward to try to touch the tip of the chin 14. stick the tongue to the right side of mouth 15. stick the tongue to the left side of mouth	3 sets of 5 repetition for 5 counts once/day, 45-minute session
WEEK 5-6 Normal side- Resisting full movement Affected side- active movement end range stretch by therapist Patient will sit in front of the mirror on a arm resting chair, therapist will stand just behind the patient also facing to the mirror	Therapist allowing to happen full movement on normal side simultaneously, giving end range stretches to the affected side All 15 previous exercises continue in addition to following exercise 16. Strain the chin with the mouth closed	3 sets of 5 repetition for 5 counts once/day, 45-minute session
WEEK 7-8 Normal side- No Resistance, active movement occurring Affected Side- Resistive Patient will sit in front of the mirror on an arm resting chair, therapist will stand just behind the patient also facing to the mirror	WEEK 1-2 Therapist apply resistance to the affected side All 16 previous exercises of above weeks continue	3 sets of 5 repetition for 5 counts once/day, 45-minute session

Fig. 23 Facial splint

Post operative facial nerve palsy grade 4
According to House Brachmann Scale

Fig. 24 Diagonal placement of hands for Frontalis muscle (Upper fulcrum)

WEEK 1-2

Fig. 25 Normal side (R)- active movement Affected side (L)- passive movement

WEEK 3-4

Fig. 26 Normal side (R)- resisting full movement. Affected side (L)- assistance

WEEK 5-6

Fig. 27 Normal side (R)- resisting full movement. Affected side (L)- end range stretch

WEEK 7-8

Fig. 28 Normal side (R)- active movement. Affected side (L)- resistance

Fig. 29 Diagonal placement of hands for Lavater labii superior muscle (intermediate fulcrum)

WEEK 1-2

Fig. 30 Normal side (R)- active movement. Affected side (L)- passive

WEEK 3-4

Fig. 31 Normal side (R)- resisting full ROM. Affected side (L)- assistance

WEEK 5-6

Fig. 32 Normal side (R)- resisting full movement. Affected side (L)- end range stretch

WEEK 7-8

Fig. 33 Normal side (R)- active movement. Affected side (L)- resistance

Fig. 34 Diagonal placement of hands for zygomaticus and risorius (lower fulcrum)

WEEK 1-2

Fig. 35 Normal side (R)- active movement. Affected side (L)- passive movement

WEEK 3-4

Fig. 36 Normal side (R)- resisting full movement. Affected side (L)- assistance

WEEK 5-6

Fig. 37 Normal side (R)- resting full movement. Affected side (L)- end range stretch

WEEK 7-8

Fig. 38 Normal side (R)- active movement Affected side (L)- resistance

Fig. 39 All the exercises were performed In front of mirror (visual feedback) Affected side (L)- assistance Statistical Analysis

Statistical analysis was performed using Statistical package of social science (SPSS v 21.0, IBM)

Frequencies and percentages were used to summarize categorical data, while means and standard deviations were employed to describe continuous data.

For the data on scores, the following statistical significance tests were used for analysis:
Repeated measures ANOVA: for comparison within the group (for comparison of mean of variables recorded at different time points in Group A and Group B).

Post hoc Bonferroni: for comparison within the group (for comparison of mean of variables recorded at each time point in Group A and Group B).

Independent (two sample) t-test: for comparison between the groups (Group A and Group B) at each time point.

For the data on scale, the following statistical significance tests were used for analysis:
Friedmann test: for comparison within the group (for comparison of proportions of variables recorded at different time points in Group A and Group B). This was followed by post hoc test with Chi-square test for comparing proportions of variables at each time point in Group A and Group B.

RESULT

Initially 68 patients were screened by using House Brackmann Facial Grading system out of which 60 met the inclusion criteria. 55 out of 60 participants completed the 8-week protocol and were assessed at the baseline, at the end of 4th and 8th week using HBS, SBFG & FDI.

The study was conducted on 60 patients of age 15-60 years for a period of 8 weeks.

In group A there were 30 patients in which 14 were females (6 Bell's palsy & 8 post operative), 16 males (9 Bell's palsy & 7 post operative).

In Group B there were 30 patients in which 14 females (6 Bell's palsy & 8 post operative), 16 males (8 Bell's palsy & 8 post operative).

Table 1: shows no significant difference is seen in House Brackmann grading between Group A (conventional) and Group B (early graded PNF) at baseline, 4 weeks, and 8 weeks indicating both the conventional and early graded Proprioceptive neuromuscular facilitation provide comparable results.

Table 1: Difference In House Brackmann Grading At Different Time Points Between Group A (conventional) and Group B (Early Graded PNF)

Time point	Chi-square value	Significance (p)
At baseline	1.882	0.597
At 4 weeks	5.913	0.315
At 8 weeks	9.347	0.096

*Significance at $p<0.05$

Table 2: shows no significant difference is present between Group A (conventional) and Group B (early graded PNF) in Sunnybrook facial composite score at baseline indicating baseline similarity.

No significant difference is present in Sunnybrook facial composite score between Group A (conventional) and Group B (early graded PNF) at 4 weeks

A significant difference is present in Sunnybrook facial composite score between Group A (conventional) and Group B (early graded PNF) at 8 weeks. The scores were significantly more in Group B (early graded PNF) compared to Group A (conventional).

Table 2: Difference In Sunnybrook Facial Composite Score

At Different Time Points Between Group A (conventional) And Group B (early graded PNF)

Time points	Grps	Mean	Mean difference	t-value	Significance (p)
Baseline	Grp A	12.37	2.33	0.687	0.495
	Grp B	10.03			
4 wks	Grp A	27.81	13.79	1.746	0.087
	Grp B	41.60			
8 wks	Grp A	49.18	18.46	2.258	0.028*
	Grp B	67.65			

*Significance at $p<0.05$

Table no. 3: shows no significant difference is present between Group A (conventional) and Group B (early graded PNF) in facial disability physical and social function scores at baseline indicating baseline similarity.

No significant difference is present in facial disability physical and social function scores between Group A and Group B at 4 weeks

A Borderline significant difference is present in facial disability physical function scores between Group A and Group B at 8 weeks. The score was borderline more in Group B compared to Group A.

A significant difference is present in facial disability social function scores between Group A (conventional) and Group B (early graded PNF) at 8 weeks. The scores were significantly more in Group B (early graded PNF) compared to Group A (conventional).

Table 3: Difference In Facial Disability Physical And Social Function Scores At Different Time Points Between Group A And Group B (Early Graded PNF)

Domain	Time point	Grps	Mean	Mean difference	t-value	Significance (p)
Physical function	Baseline	Grp A	31.85	2.17	0.932	0.356
		Grp B	29.67			
	4 wks	Grp A	45.81	7.61	1.182	0.243
		Grp B	53.42			
	8 wks	Grp A	62.03	12.35	1.992	0.052
		Grp B	74.39			
Social function	Baseline	Grp A	5.62	6.58	1.857	0.069
		Grp B	12.21			
	4 wks	Grp A	34.44	9.30	1.124	0.266
		Grp B	43.75			
	8 wks	Grp A	58.62	19.12	2.778	0.008*
		Grp B	77.75			

*Significance at $p<0.05$

DISCUSSION

The aim of this study was to evaluate the efficacy of an early graded Proprioceptive Neuromuscular Facilitation (PNF) program compared to conventional occupational therapy in patients with facial nerve palsy. Results demonstrated significantly greater improvements in facial function in the group receiving early graded PNF, as measured by the House-Brackmann Grading System (HBFGS), Sunnybrook Facial Grading System (SBFGS), and the Facial Disability Index (FDI) after an 8-week intervention. Notably, patients progressed functionally from higher to lower grades (improved scores) on the HBFGS, indicating a marked improvement in facial nerve function and expression.

However, it is important to note that HBFGS showed relatively equal improvement in both groups, potentially limiting its sensitivity in detecting subtle changes. Clinical observations during the intervention period revealed that recovery in the upper facial region (particularly the eyes) occurred earlier and more noticeably than in the lower facial region (e.g., mouth). This gradation of improvement was not adequately captured by the HBFGS due to its coarse grading structure, which lacks the ability to measure partial improvements. Therefore, a more sensitive and precise assessment scale may be necessary to accurately, hence relying solely on HBFGS may not provide a complete picture of functional recovery. In this thesis, more precise and sensitive assessment tools, such as the SBFGS and FDI, have been incorporated to enable a more nuanced analysis of facial function and disability. These scales allow for the detection of minute, region-specific changes in facial muscle recovery.

The superior outcomes associated with the PNF technique are likely due to its facilitative effect on neuromuscular re-education. Functional recovery was accelerated and impairment was decreased through the restoration of voluntary muscle control and face symmetry through the systematic and gradual stimulation of neuromuscular pathways. The study's conclusions are in line with earlier investigations.

A case study by Pooja Kumari Digra et al. (Indian Journal of Physiotherapy & Occupational Therapy, 2020) reported overall improvement in facial muscle function and symmetry following PNF in patients with Bell's palsy. [29] Similarly, Giorgio Lo Giudice et al. (MDPI, Switzerland, 2022) concluded that early Kabat rehabilitation led to faster recovery in patients with postoperative facial nerve palsy. [30] Shambhu Prasad Adhikari (Journal of Chitwan Medical College, Nepal, 2020) also observed significant improvements in impairments and functional levels on the SBFGS and HBFGS scales following Kabat-based interventions. [19] where Wan Syahirah W. Samsudin (Malaysian Journal of Medicine and Health Sciences, 2017) concluded that although the House-Brackmann Grading System (HBGS) has certain limitations, it remains the global standard for facial nerve assessment due to its simplicity and speed. The study emphasized the need for objective, HBGS-based assessment tools capable of automated evaluation and progress monitoring during rehabilitation. The author further highlighted the importance of developing publicly available databases to support advancements in this field. Consequently, the HBGS was used alongside two additional facial grading scales for a more comprehensive outcome evaluation. [31]

An RCT by S. Monini et al. (Acta Italica, 2016) verified that in severe cases of Bell's palsy, steroid medication in conjunction with Kabat rehabilitation improved recovery. [17] Furthermore, Kanwal Khanzada et al. (BLDE University Journal of Health Sciences, 2018) found Kabat rehabilitation more effective than facial exercises with nerve stimulation in improving physical and social functions. [21] Barbara M. et al. (Acta Otolaryngology, Italy, 2003) supported early rehabilitation, recommending Kabat techniques soon after surgery, particularly in cases with severe facial nerve deficit. [14]

Nevertheless, Michelly Cardoso Silva et al.'s systematic review from 2022 pointed out flaws in the body of research, pointing out that the majority of trials mixed PNF with other treatments and lacked methodological rigor. [7] The review concluded that evidence on the effectiveness of PNF as a standalone intervention remains inconclusive and should be interpreted with caution.

In contrast, the present study focused specifically on a graded PNF program used as a sole intervention, structured week-wise across the three fulcrums (upper, intermediate, and lower) and enhanced with visual feedback. This targeted design aimed to optimize the direction of facilitation and patient engagement.

Based on comparative analysis with existing literature and the findings of this study, both Conventional Occupational Therapy and Early Graded PNF programs were found effective in improving facial muscle function, Psychosocial well-being and resting symmetry in individuals with facial nerve palsy. However, the Early Graded PNF program demonstrated statistically greater improvement across all measured outcomes (HBFGS, SBFGS, and FDI), thereby establishing it as a more effective intervention for early rehabilitation in facial nerve palsy.

CONCLUSION

The result and findings of the present study concluded that the Early graded proprioceptive neuromuscular facilitation program was effective as compared to Conventional Occupational Therapy in treating facial nerve palsy.

As Conventional Occupational Therapy also showed a significant improvement in treating facial nerve palsy but, not as marked as Early graded proprioceptive neuromuscular facilitation program so in early graded PNF program few activities from conventional Occupational Therapy like blowing paper of different thickness at different distance & sucking water using straw can be used as an adjunct for speedy recovery.

Strengths Of The Study

Focused on sole Proprioceptive Neuromuscular Facilitation intervention

Sequential exercises for early graded Proprioceptive Neuromuscular Facilitation in each of the three fulcrums, organized by week

Outcome measures Sunnybrook Facial Nerve Grading System and Facial Disability Index was appropriately chosen for assessment of facial function and social function.

Limitations Of The Study

The study was carried out at a single centre therefore results of this study cannot be generalized.

Recommendation Of The Study

In cases of central nerve palsy, proprioceptive neuromuscular facilitation (upper motor neuron) should also be utilized.

House Brackmann should be used with the other functional outcome measures.

Early graded Proprioceptive neuromuscular facilitation should program can be used as adjunctive for speedy recovery.

A multicentric study can be conducted.

Declaration by Authors

Ethical Approval: Approved

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REFERENCES

1. Singh, V. (2017). *Textbook of Clinical Neuroanatomy* (3rd ed.). Elsevier Health Sciences.
2. Chaurasia, B. D. (2019). *Human Anatomy, Volumes 3 and 4: Regional and Applied Dissection and Clinical – Head and Neck, and Brain-Neuroanatomy* (Rev. ed.). CBS Publishers & Distributors.
3. Clarke, C. (2022). *Neurology: A Clinical Handbook*. Wiley.
4. Gupta, S., & Gupta, V. (2022). Incidence and management of Bell's palsy in peripheral facial paralysis cases. *International Journal of Research in Medical Sciences, 10*(3), 644–649. https://doi.org/10.18203/2320-6012.ijrms20220562
5. Hohman, M. H., Warner, M. J., & Varacallo, M. A. (2024, October 6). Bell palsy. In *StatPearls*. StatPearls Publishing. Retrieved May 24, 2025, from https://www.ncbi.nlm.nih.gov/books/NBK482290/
6. Ho, M. L., Juliano, A., Eisenberg, R. L., et al. (2015). Anatomy and pathology of the facial nerve. *AJR American Journal of Roentgenology, 204*(6), W612–W619.
7. Silva, M. C., Oliveira, M. T., Azevedo-Santos, I. F., et al. (2022). Effect of proprioceptive neuromuscular facilitation in the treatment of dysfunctions in facial paralysis: A systematic literature review. *Brazilian Journal of Physical Therapy, 26*(6), 100454.
8. Shyni, M. (2021). Efficacy of facial splint in improving facial symmetry in the management of Bell's palsy among community dwellers. *International Journal of Development Research, 07*, 48509–48512.
9. Ali, N., & Alam, M. S. (2020). Effect of occupational therapy based intervention to improve facial functions, quality of life and reduce depression in a young male with Bell's palsy. *International Journal of Creative Research Thoughts, 8*(5), 2320–2882.
10. Tuncay, F., Borman, P., Taşer, B., et al. (2015). Role of electrical stimulation added to conventional therapy in patients with idiopathic facial (Bell) palsy. *American Journal of Physical Medicine & Rehabilitation, 94*(3), 222–228.
11. Beurskens, C. H. G., & Heymans, P. G. (2006). Mime therapy improves facial symmetry in people with long-term facial nerve paresis: A randomised controlled trial. *Australian Journal of Physiotherapy, 52*(3), 177–183. http://dx.doi.org/10.1016/s0004-9514(06)70026-5
12. Prajapati, P., & Patel, S. (2021). Effectiveness of electrical stimulation with mime therapy versus electrical stimulation with motor imagery technique in patients with Bell's palsy: A comparative study. *International Journal of Science and Research (IJSR), 10*(3), 1669–1674.
13. Hindle, K. B., Whitcomb, T. J., Briggs, W. O., et al. (2012). Proprioceptive neuromuscular facilitation (PNF): Its mechanisms and effects on range of motion and muscular function. *Journal of Human Kinetics, 31*, 105–113.
14. Barbara, M., Monini, S., Buffoni, A., et al. (2003). Early rehabilitation of facial nerve deficit after acoustic neuroma surgery. *Acta Oto-Laryngologica, 123*(8), 932–935.
15. Arianna, A. S. (2015). Another scale for the assessment of facial paralysis? ADS Scale: Our proposition, how to use it. *Journal of Clinical and Diagnostic Research, 9*(12), MC08–MC11.
16. Boschetti, C. E., Lo Giudice, G., Spuntarelli, C., et al. (2022). Kabat rehabilitation in facial nerve palsy after parotid gland tumor surgery: A case-control study. *Diagnostics (Basel), 12*(3), 565.
17. Monini, S., Iacolucci, C. M., Di Traglia, M., et al. (2016). Role of Kabat rehabilitation in facial nerve palsy: A randomised study on severe cases of Bell's palsy. *Acta Otorhinolaryngologica Italica, 36*(4), 282–288.
18. Hamed, S. A., Mahmoud, L. S., ElMeligie, M. M., et al. (2023). Electrophysiological responses to Kabat motor control re-education on Bell's palsy: A randomized controlled study. *Journal of Musculoskeletal & Neuronal Interactions, 23*(1), 90–97.
19. Adhikari, S. P., Chaudhary, M., & Dev, R. (2020). Kabat interventions integrated with facial expressive and functional exercises for better and speedy recovery in Bell's palsy: A pre-post design. *Journal of Chitwan Medical College, 10*(4), 71–76. http://dx.doi.org/10.54530/jcmc.196
20. Mirzakhani, N., Angooti Oshnari, L., Akbarzadeh Baghban, A., et al. (2017, July 2). The comparison between exercise therapy and biofeedback therapy in facial function and quality of life of Bell's palsy. *Journal of Clinical Physiotherapy Research, 2*(3), 140–144. https://journals.sbmu.ac.ir/physiotherapy/article/view/16002
21. Qamar, M., Khanzada, K., Ijaz Gondal, M., et al. (2018). Comparison of efficacy of Kabat rehabilitation and facial exercises along with nerve stimulation in patients with Bell's palsy. *BLDE University Journal of Health Sciences, 3*(1), 31.
22. Tharani, G., Gopinath, Y., Raja, L. V., et al. (2018). Comparison of PNF versus conventional exercises for facial symmetry and facial function in Bell's palsy. *International Journal of Current Advanced Research*. http://10.24327/ijcar.2018.9350.1542
23. Pradeep, M. (2019). *Effectiveness of proprioceptive neuromuscular facilitation and neuromuscular re-education for reducing facial disability and synkinesis in patients with Bell's palsy: A comparative study* [Master's thesis, P.P.G. College of Physiotherapy, Tamil Nadu Dr. M.G.R. Medical University].
24. Goyal, H., & Koley, S. (2021). Comparison of proprioceptive neuromuscular facilitation and neuromuscular re-education with conventional treatment and home based exercise plan along with facial nerve stimulation for reducing facial disability in patients with Bell's palsy. *International Journal of Medical Science and Diagnostic Research, 5*(6).
25. Reitzen, S. D., Babb, J. S., & Lalwani, A. K. (2009). Significance and reliability of the House-Brackmann grading system for regional facial nerve function. *Otolaryngology–Head and Neck Surgery, 140*(2), 154–158. https://doi.org/10.1016/j.otohns.2008.11.021
26. Neely, J. G., Cherian, N. G., Dickerson, C. B., et al. (2010). Sunnybrook facial grading system: Reliability and criteria for grading. *Laryngoscope, 120*(5), 1038–1045.
27. VanSwearingen, J. M., & Brach, J. S. (1996). The Facial Disability Index: Reliability and validity of a disability assessment instrument for disorders of the facial neuromuscular system. *Physical Therapy, 76*(12), 1288–1298.
28. Shyni, M. (2021). Efficacy of facial splint in improving facial symmetry in the management of Bell's palsy among community dwellers. *International Journal of Development Research, 7*, 48509–48512.
29. Boschetti, C. E., Lo Giudice, G., Spuntarelli, C., Apice, C., Rauso, R., Santagata, M., et al. (2022). Kabat rehabilitation in facial nerve palsy after parotid gland tumor surgery: A case-control study. *Diagnostics (Basel), 12*(3), 565. https://doi.org/10.3390/diagnostics12030565
30. Kumari, P. (2020, July 22). Proprioceptive neuromuscular facilitation in LMN facial palsy: A case report. *Indian Journal of Physiotherapy and Occupational Therapy, 14*(3), 171–174. https://medicopublication.com/index.php/ijpot/

article/view/9690
31. Samsudin, S. W., Samad, R., Sundaraj, K., Mustafa, M., & Abdullah, N. R. H. (2017). Correlation of objective assessment of facial paralysis with House-Brackmann score. *TELKOMNIKA*, *15*(2), 829. https://doi.org/10.12928/telkomnika.v15i2.6128