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Effect of Nerve Mobilization of The Facial Nerve on Patients with Bell's Palsy

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ABSTRACT

Background- Nerve mobilization techniques are known to be effective in nerve rehabilitation; however, there is a lack of evidence regarding their effect on facial nerve mobilization in acute Bell's palsy.

Objectives- The objective of our study was to evaluate the effect of facial nerve mobilization over conventional physiotherapy in improving facial symmetry and synkinesis severity in patients with acute Bell's palsy**.**

Methods: A total of 30 patients, both male and female, aged between 18 and 60 years with unilateral Bell's palsy, were included in the study based on inclusion and exclusion criteria. Patients were randomly assigned to two groups: Group A (n=15) received nerve mobilization and conventional physiotherapy, including facial exercises, facial massage and electrical stimulation, while Group B (n=15) received placebo nerve mobilization and conventional physiotherapy. Each group received interventions for 3 sessions per week for 6 weeks (18 sessions). Patients were assessed at the end of 3rd week and 6th week using the Sunnybrook Facial Grading System (SFGS) and Synkinesis Assessment Questionnaire (SAQ) to measure recovery and effectiveness.

Results- After statistical analysis, both groups demonstrated significant improvements in facial symmetry and synkinesis severity, as reflected by the SFGS and SAQ scores. However, intergroup comparison revealed that Group A showed significantly greater improvement than Group B ($p < 0.05$).

Conclusion- Facial nerve mobilization is likely to be an effective adjunctive intervention in addition to conventional physiotherapy in improving facial symmetry and synkinesis severity in acute Bell's palsy.

KEYWORDS: Bell's palsy, Electrical Stimulation, Massage, Neural Mobilisation, Synkinesis

INTRODUCTION

Bell's palsy is a sudden, one-sided facial nerve paralysis that causes the inability to move muscles on the affected side of the face. It is an idiopathic disorder of the facial nerve (cranial nerve VII), resulting in acute facial weakness. The condition is named after Sir Charles Bell, who first described the facial nerve in 1821.[1] Bell's palsy is a condition affecting the facial nerve, causing sudden one-sided facial paralysis. It occurs in about 15–30 per 100,000 people each year. Most patients recover quickly, with around 85% improving within three weeks, though about 29% may have residual effects such as mild asymmetry or persistent facial contractures.[2] Bell's palsy is the most common cause of facial paralysis, responsible for about 75% of cases. Bell's palsy affects men and women equally and can occur at any age.[3] Its incidence varies by region, with a global rate of 11–40 per 100,000 people annually. It most commonly affects individuals aged 15–45 years, with no significant gender difference. However, it is three times more common in pregnant women, with an incidence of around 45 per 100,000, and 5–10% of patients have associated Diabetes Mellitus.[4] The human facial nerve (cranial nerve VII) is a mixed nerve containing motor, sensory, and parasympathetic components.[5]Bell's palsy has an unclear pathogenesis and is considered idiopathic, though immune, ischemic, and genetic factors are strongly linked to its development.[6] The viral infection theory proposes that HSV-1 and VZV can activate or reactivate, leading to inflammation and swelling of the facial nerve, which may cause facial paralysis.[7] Bell's palsy begins suddenly, with symptoms ranging from mild facial weakness to complete paralysis, and the severity varies from person to person.[8] Bell's palsy symptoms start suddenly, reaching maximum severity within 48–72 hours, and range from mild facial fatigue to severe paralysis on the affected

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side.[6] Physiotherapy is a key part of recovery in Bell's palsy. It helps ease pain, strengthens weak facial muscles, and restores functional abilities limited by discomfort or weakness—ultimately improving the patient's overall quality of life.[7] Nerve mobilization works to restore the balance between nerve movement and surrounding tissues. It promotes nerve gliding, reduces adhesions, and enhances both vascular supply and axoplasmic flow.[9] Nerve mobilization uses manual techniques or exercise to improve movement between nerves and surrounding tissues, helping restore flexibility and function.[10]

Therefore, the purpose of our study was to evaluate the effect of the addition of the facial nerve mobilization technique to the conservative treatment of acute Bell's palsy. We hypothesise that the addition of facial nerve mobilization to conservative treatment would lead to greater improvements in facial movement and symmetry than conservative treatment alone in patients with acute Bell's palsy.

MATERIAL AND METHODS

Study design- This study was a randomized controlled trial (RCT) conducted to evaluate the effectiveness of the intervention among the selected participants.

Study settings - Our study duration was from September 2025 to March 2026. A study was conducted at the OPD of University College of Physiotherapy, Faridkot and IPD and OPD of the Department of Neurology of Guru Gobind Singh Medical College and Hospital, Faridkot. The Institutional Ethical considerations were strictly used in the study. Before commencement of the study, approval was taken from the Institutional Ethical Committee, UCOP, Baba Farid University of Health and Sciences, Faridkot (No. BFUHS/2K25p-TH/22502).

Participants' recruitment - After the diagnosis by the neurologist, the patients were referred to the outpatient physical therapy department following the onset of Bell's palsy and were aged between 18 - 60 years. Patients were invited to take part and signed the written consent form. Patients who agreed and signed the consent form were assessed for the inclusion criteria that included Patients with moderate to severe acute Bell's palsy were included in the study. Only those patients who were classified as Grade IV on the Modified House–Brackmann Scale were selected. The study included individuals with unilateral involvement, and both male and female participants were considered eligible for inclusion.

Non-cooperative patients, had any open wound or ulcer over the face, had undergone surgery related to dental, ear, nose, or throat regions, or had any other neurological disease were excluded from the study.

Sampling method - Participants were recruited using consecutive sampling, whereby all patients presenting to the outpatient department who met the inclusion criteria were enrolled until the required sample size was reached. After enrolment, participants were randomly allocated into two groups in a 1:1 ratio using computer-generated random numbers. Allocation concealment was maintained using sequentially numbered opaque sealed envelopes (SNOSE) containing the group assignments. The envelopes were opened only after participant enrolment.

Outcome variables- The Sunnybrook Scale[11] is a reliable and valid tool used to assess the severity of facial muscle paralysis. It evaluates facial function through three components: resting symmetry, voluntary facial movements, and synkinesis. The total score ranges from 0 to 100, with higher scores indicating better facial recovery. The assessment includes evaluation of facial symmetry at rest, performance of five voluntary facial expressions, and the severity of associated movements, providing a comprehensive measure of facial nerve recovery.

The Synkinesis Assessment Questionnaire is a patient-reported questionnaire used to assess facial synkinesis. It consists of multiple items addressing common symptoms experienced by patients. Each item is rated on a 1–5 scale, and the total score is converted to a 0–100 scale, with higher scores indicating greater severity of synkinesis. The questionnaire demonstrates high internal consistency and excellent test–retest reliability, making it a dependable tool for evaluating synkinesis.[12]

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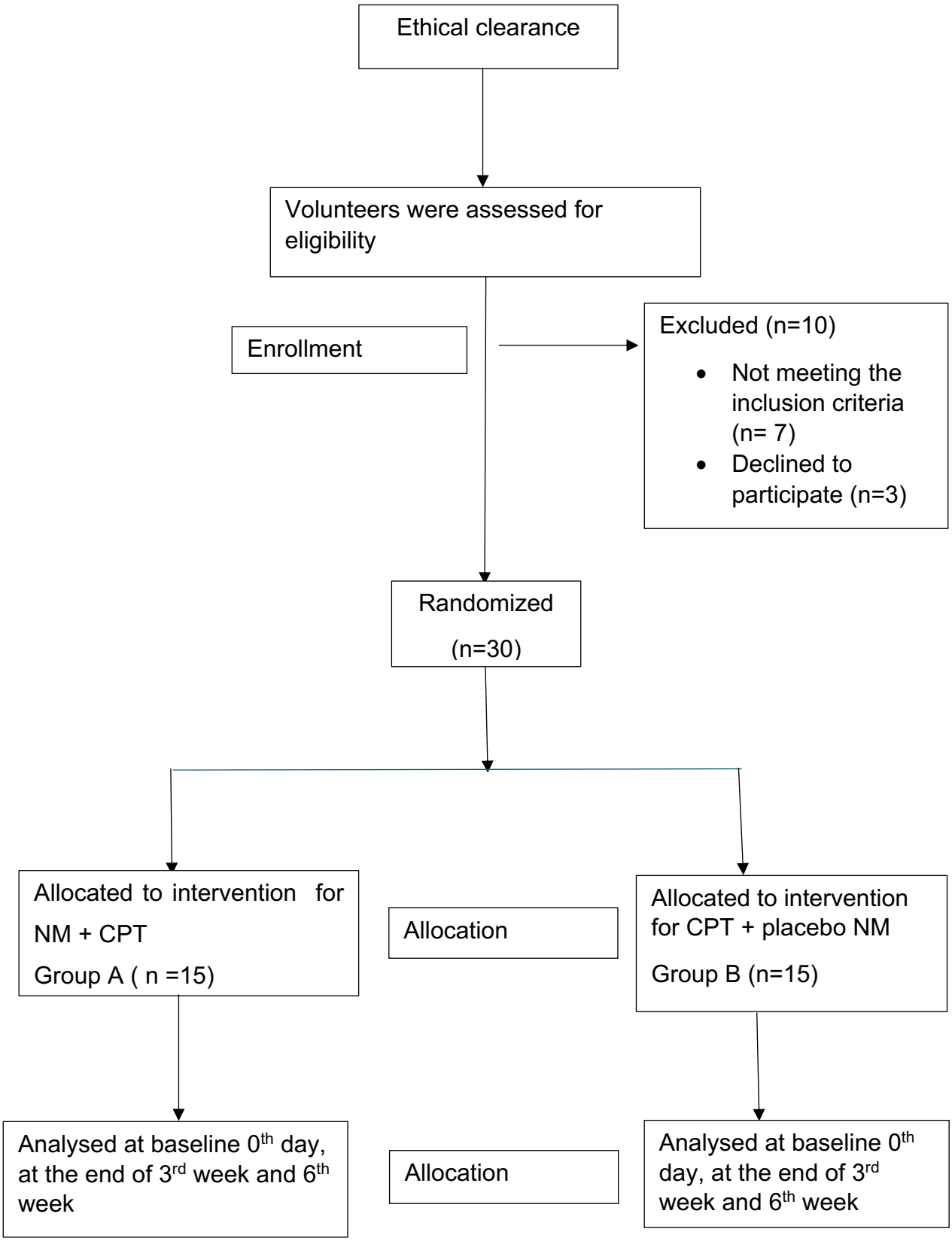

Fig1.1 CONSORT flow diagram

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Intervention - Patients were randomly allocated into two groups using a simple random sampling technique: Group A (n = 15) and Group B (n = 15). Group A received nerve mobilization of the facial nerve along with conventional physiotherapy, while Group B received placebo nerve mobilization in addition to conventional physiotherapy. Both groups underwent treatment for 6 weeks, with 3 sessions per week, totalling 18 sessions. Assessments were conducted at three time points: baseline (day 0, before intervention), at 3 weeks, and at 6 weeks. Outcome measures were recorded for each participant at all three intervals using individual data collection forms.

GROUP A

Nerve Mobilization

The total duration of Nerve Mobilization was approximately 15 minutes, including rest intervals. The patient was positioned supine with the head slightly turned toward the side being treated.[13] The therapist, wearing sterile gloves and using talcum powder to reduce friction, sat at the head end of the treatment table. One hand stabilized the patient's head, while the other performed facial nerve mobilization.[2] The index finger was placed anterior to the external acoustic meatus and directed anteriorly and medially to contact the stylomastoid foramen. The index and middle fingers of the opposite hand were then positioned along the anterior border of the mastoid process to apply posterior-medial mobilization. Circular movements and horizontal traction were performed for 25 repetitions in three sets, with 5-second rests between repetitions and 30-second rests between sets.[13]

Conventional Physiotherapy

The total duration of the conventional physiotherapy was 45 minutes, including facial massage, facial exercises, and electrical stimulation.

Facial massage was administered in the supine position for 10 minutes and included stroking, circular massage, effleurage, kneading, picking-up, wringing, and hacking techniques to promote circulation and relaxation.[3] Facial exercises consisted of ten facial expression movements, including eyebrow raising, nostril flaring, eye closure, frowning, smiling, lip pursing, sucking, crying, and laughing expressions. Each exercise was performed 10 times under supervision and repeated 3–4 times daily at home in front of a mirror to avoid fatigue.

Electrical stimulation was administered to restore facial muscle tone. Stimulation intensity was determined by eliciting a minimal visible contraction on the unaffected side. The passive electrode was placed over the C7 region, while the active electrode was applied to facial muscle motor points, including the frontalis, orbicularis oculi, zygomaticus, buccinator, nasalis, orbicularis oris, levator muscles, and mentalis. Each motor point received two sets of 30 contractions, while the facial nerve trunk received one set of 60 contractions using faradic current.[14,15]

Group B (n=15) – Same as in group A

Conventional Physiotherapy

Conventional physiotherapy is the same as given in group A.

Placebo Neural Mobilisation

The placebo facial nerve mobilisation followed all the procedures of real facial nerve mobilisation without applying horizontal and circular auricular traction.[13]

Statistical analysis

Data was systematically organised and analyzed using descriptive statistics, including mean and standard deviation. Intra-group comparisons within Group A and Group B for the Synkinesis Assessment Questionnaire (SAQ) and Sunnybrook Facial Grading System (SFGS) scores were performed using the paired t-test. Inter-group comparisons between Group A and Group B were conducted using the unpaired t-test. The level of statistical significance was set at $p < 0.05$.

Normality of data was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Given the small sample size (n = 15), greater emphasis was placed on the Shapiro–Wilk test. In Group A, SFGS scores at baseline (0 week), 3 weeks, and 6 weeks were normally distributed ($p > 0.05$). SAQ scores were normally distributed at 0 and 3 weeks ($p > 0.05$), while at 6 weeks they showed deviation from normality ($p = 0.021$).

In Group B, SFGS and SAQ scores were normally distributed at all time points, as indicated by non-significant results ($p > 0.05$) in both tests.

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RESULTS

Of 40 patients screened for eligibility, 30 patients were included. No participants were lost in follow-up. Assessment was performed by the Sunnybrook Facial Garding system and Synkinesis assessment Questionnaire. The unpaired t-test was used to compare Sunnybrook Facial Grading System (SFGS) scores between Group A and Group B at different assessment periods. At baseline (0th day), the mean SFGS score was 32.87±7.745 for Group A and 36.07±5.922 for Group B, with a mean difference of 3.20. The calculated t-value (1.271) was less than the tabulated value at the 5% level, indicating no significant difference between groups at baseline. At the 3rd week, the mean scores increased to 51.87±8.518 (Group A) and 43.73±7.450 (Group B), with a mean difference of 8.14. The calculated t-value (2.784) exceeded the tabulated value, indicating a statistically significant difference. At the 6th week, Group A (70.60±9.826) showed further improvement compared to Group B (50.80±5.213), with a mean difference of 19.80 and a t-value of 6.894, confirming a significant difference between the groups.

Similarly, the unpaired t-test was applied to compare Synkinesis Assessment Questionnaire (SAQ) scores. At baseline, the mean scores were 65.131±6.875 (Group A) and 68.80±6.581 (Group B), with a mean difference of 3.667 and a non-significant t-value (1.492). At the 3rd week, the mean difference increased to 13.467, with scores of 45.731±8.531 (Group A) and 59.20±8.257 (Group B), and a significant t-value of 4.393. At the 6th week, the difference further increased to 22.267, with scores of 28.931±5.946 (Group A) and 51.20±10.241 (Group B), and a t-value of 7.282, indicating a statistically significant difference.

Overall, the findings indicate that although both groups were comparable at baseline, Group A demonstrated significantly greater improvement than Group B over time across all outcome measures, including the Sunnybrook Facial Grading System and Synkinesis Assessment Questionnaire. These results suggest that the intervention applied to Group A was more effective in enhancing facial function, reducing synkinesis, and improving quality of life compared to Group B.

Table 5.1: Independent t-test for comparison at 0th day, 3rd week and 6th week score measurements of SFGS between Group A and Group B.

Unpaired t-test	Comparison					
	Sunny Brook facial grading system					
	0th day		3rd week		6th week	
	Group-A	Group-B	Group-A	Group-B	Group-A	Group-B
Mean	32.87	36.07	51.87	43.73	70.60	50.80
S.D.	7.745	5.922	8.518	7.450	9.826	5.213
N	15	15	15	15	15	15
M.D.	3.20		8.14		19.80	
df	28		28		28	
Unpaired t-test	1.271		2.784		6.894	
P value	0.214		<0.001*		<0.001*	
Result	Non-Significant		Significant		Significant	

Table 5.2: Independent t-test for comparison at 0th day, 3rd week and 6th week score measurements of SAQ between Group A and Group B.

Unpaired t-test	Comparison					
	Synkinesis assessment questionnaire					
	0th day		3rd week		6th week	
	Group-A	Group-B	Group-A	Group-B	Group-A	Group-B
Mean	65.131	68.80	45.731	59.20	28.931	51.20
S.D.	6.875	6.581	8.53	8.257	5.946	10.241
N	15	15	15	15	15	15
M.D.	3.667		13.467		22.267	

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df	28	28	28
Unpaired 't' test	1.492	4.393	7.282
P value	0.146	<0.001*	<0.001*
Result	**Non-Significant**	**Significant**	**Significant**

p>0.05 Non-Significant (NS)
p<0.05 Significant (S)

DISCUSSION

The results of this randomised controlled trial showed that 3-weeks of facial neural mobilisation, in addition to physiotherapy treatment, improved facial movement and symmetry following acute idiopathic facial muscle paralysis to a greater extent than usual physiotherapy treatment.

The findings of the present study are consistent with the results reported by Raed Alharbi et al. (2023),[2] who conducted a randomized controlled trial examining the effect of adding facial nerve nerve mobilization to conventional physiotherapy in patients with acute Bell's palsy. Their study demonstrated significantly greater improvement in facial symmetry and voluntary facial movements in the group receiving neural mobilisation. Higher facial grading scores were observed after three weeks of treatment, suggesting that nerve mobilization enhances nerve recovery and functional outcomes. These results strongly support the findings of the present study.

Further support is provided by the case report by Kashoo, Alqahtani, and Ahmad[16] which highlighted notable improvements in facial symmetry and voluntary facial movements following facial nerve neural mobilisation. These improvements were attributed to enhanced nerve mobility, reduced intraneural pressure, and improved axoplasmic flow. However, as the evidence was derived from a single case, the findings cannot be generalized and must be interpreted cautiously. Nonetheless, the report emphasises the potential clinical value of nerve mobilization and the need for further controlled trials.

In contrast to the present findings, Shahid Ahmed (Heera) et al.[8] compared nerve mobilization with proprioceptive neuromuscular facilitation techniques and reported no statistically significant difference between the two interventions. The authors concluded that nerve mobilization was not superior to proprioceptive neuromuscular facilitation in improving facial function. These contrasting findings suggest that the effectiveness of nerve mobilization may depend on factors such as stage of the condition, treatment protocol, dosage, and duration of intervention.

Nerve mobilization works by improving both the mechanical and physiological properties of the nerve, complementing conventional physiotherapy in Bell's palsy. It restores normal nerve movement, reduces adhesions and intraneural pressure, and enhances blood flow, which supports healing. It also improves axoplasmic flow, aiding nerve regeneration and conduction. In contrast, conventional physiotherapy mainly focuses on muscle re-education, strengthening, and preventing complications like contractures and synkinesis. While effective for muscle function, it does not directly address nerve mobility.

Therefore, combining both approaches provides better outcomes, as nerve mobilization improves nerve health while conventional therapy enhances muscle function, leading to more effective overall rehabilitation.

CONCLUSION

Facial nerve mobilization added with conventional intervention was more effective in improving the facial symmetry, functional abilities, reduction in functional disability, and decreased synkinesis severity among patients with Bell's palsy. These improved outcomes may be due to the effects of nerve mobilization in enhancing nerve mobility, improving neural conduction, and promoting better neuromuscular function. In addition, this combined approach may help reduce long-term complications such as residual weakness and synkinesis.

LIMITATIONS

This study has several limitations. It lacks long-term follow-up, which restricts understanding of the sustained effects of the intervention. The nerve mobilization technique used is still not fully developed or validated, although this is among the first

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randomized controlled trials to examine its effect in Bell's palsy. The study population included only healthy individuals without conditions such as diabetes or hypertension, limiting the generalizability of the findings. In addition, the sample size was relatively small, which may have led to an overestimation of the treatment effect. Moreover, direct assessment of facial nerve mobilization was not possible. Therefore, future research should consider using imaging methods such as ultrasonography to objectively evaluate facial nerve movement.

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