



Comparative Effect of Kinesio Taping and Neurofacilitation Therapies in Bell's Palsy Rehabilitation: A Randomized Controlled Trial

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ABSTRACT

Bell's palsy is an acute peripheral facial paralysis that significantly affects facial symmetry, functional ability, and quality of life, where non-pharmacological rehabilitation plays a key role in recovery. This randomized controlled trial aimed to compare the effectiveness of kinesio taping with neurofacilitation therapies (proprioceptive neuromuscular facilitation and mime therapy) in improving facial function and reducing synkinesis. Thirty patients with Bell's palsy were randomly allocated into two groups ($n = 15$ each). Group A received kinesio taping with conventional facial exercises, while Group B received neurofacilitation therapies for 6 weeks. Outcome measures included the Sunnybrook Facial Grading System (SFGS), Synkinesis Assessment Questionnaire (SAQ), and Facial Disability Index (FDI). Both groups demonstrated improvement following intervention. Group A showed statistically significant improvement in all outcome measures ($p < 0.001$), whereas Group B showed significant improvement in SFGS, SAQ, and FDI-SF scores ($p < 0.001$), while improvement in FDI-PF was not statistically significant ($p = 0.297$). Between-group comparison revealed significantly greater improvement in Group A in SFGS, SAQ, and FDI-PF scores ($p \leq 0.001$). These findings indicate that kinesio taping combined with facial exercises is more effective than neurofacilitation therapies in improving facial function and reducing synkinesis, supporting its role as a safe and effective non-pharmacological rehabilitation strategy.

Keywords: Bell's palsy; kinesio taping; neurofacilitation; proprioceptive neuromuscular facilitation; mime therapy; facial rehabilitation; synkinesis.

1. INTRODUCTION

Bell's palsy is an acute, idiopathic, unilateral lower motor neuron paralysis of the facial nerve (cranial nerve VII), characterized by sudden onset of facial weakness, impaired voluntary movements, and altered facial symmetry.¹ The condition accounts for approximately 60–75% of all cases of acute facial paralysis, with an annual incidence ranging between 15 and 30 per 100,000 population.² Although the exact etiology remains unclear, viral reactivation, particularly herpes simplex virus type 1, ischemic injury, and inflammatory processes have been implicated in its pathogenesis.³

Clinically, patients present with inability to close the eye, drooping of the mouth, impaired speech,

difficulty in mastication, and reduced emotional expression, significantly affecting both functional and psychosocial well-being.⁴ While spontaneous recovery occurs in a majority of patients, approximately 20–30% develop long-term complications such as facial asymmetry, muscle weakness, and synkinesis, which can severely impact quality of life.⁵

Conventional management of Bell's palsy primarily involves pharmacological interventions, including corticosteroids and antiviral agents, aimed at reducing inflammation and viral activity.⁶ However, these treatments are often associated with potential adverse effects and do not directly address functional rehabilitation of facial muscles.⁷

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Furthermore, pharmacological therapy alone may be insufficient in preventing long-term complications such as synkinesis and residual facial dysfunction.⁸

In this context, non-pharmacological and rehabilitative approaches have gained increasing importance as complementary and alternative strategies for improving functional recovery. These approaches align with the growing emphasis on integrative medicine and patient-centered care, particularly in conditions where functional restoration is critical.⁹ Rehabilitation strategies aim to enhance neuromuscular control, improve facial symmetry, and prevent maladaptive motor patterns through targeted therapeutic interventions.¹⁰

Among these, proprioceptive neuromuscular facilitation (PNF) is widely used to stimulate neuromuscular responses through proprioceptive input, facilitating coordinated muscle activation and motor relearning.¹¹ Similarly, mime therapy, which involves facial exercises combined with emotional expression training and biofeedback, has shown effectiveness in improving facial symmetry and reducing synkinesis.¹² Despite their benefits, these techniques often require persisted training, patient compliance, and skilled supervision, which may limit their practicality in certain clinical settings.¹³

More recently, kinesio taping has emerged as a promising non-invasive therapeutic modality in neurorehabilitation. It involves the application of elastic therapeutic tape to the skin, which provides continuous sensory stimulation, enhances proprioceptive feedback, improves circulation, and facilitates muscle activation without restricting movement.¹⁴ The mechanism of kinesio taping is believed to involve stimulation of cutaneous mechanoreceptors, leading to improved neuromuscular control and functional recovery.¹⁵ Additionally, it may reduce edema, support weakened muscles, and promote optimal alignment of facial structures.¹⁶

The increasing interest in kinesio taping reflects a broader shift toward alternative and adjunctive therapies that are safe, cost-effective, and easy to apply. Such approaches are particularly relevant in the context of drug vigilance and therapeutic optimization, where minimizing adverse effects while maximizing functional outcomes is a key objective.¹⁷ Despite its growing use, evidence comparing kinesio taping with established rehabilitation techniques such as PNF and mime

therapy remains limited and inconclusive.¹⁸

Furthermore, most existing studies have focused on individual therapeutic modalities rather than direct comparative evaluation, creating a gap in evidence regarding the relative effectiveness of these interventions.¹⁹ Addressing this gap is essential for guiding clinical decision-making and optimizing rehabilitation strategies in patients with Bell's palsy.

Therefore, the present study was designed to compare the effectiveness of kinesio taping combined with conventional facial exercises versus neurofacilitation techniques (PNF and mime therapy) in improving facial function and reducing synkinesis in patients with Bell's palsy. This study aims to contribute to the growing body of evidence supporting integrative and non-pharmacological approaches in neurorehabilitation.

2. MATERIAL & METHODS

2.1 Study Design

The present study was designed as a prospective, parallel-group randomized controlled trial to evaluate the comparative effectiveness of kinesio taping and neurofacilitation therapies in patients with Bell's palsy. The study was conducted in the Department of Physiotherapy at KIMS Hospital (Krishna Institute of Medical Sciences) and Galaxy Hospital, Hyderabad, Telangana, India over a period of March 2018 to February 2019. The trial design and reporting were structured in accordance with the Consolidated Standards of Reporting Trials (CONSORT) guidelines to ensure methodological rigor and transparency.²⁰

The study protocol was reviewed and approved by the Institutional Ethics Committee of KIMS College of Physiotherapy, Hyderabad, India and conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.²¹ Written informed consent was obtained from all participants prior to participation.

2.2 Participants

A total of 30 patients diagnosed with unilateral Bell's palsy were recruited for the study. Participants were selected based on predefined inclusion and exclusion criteria. Patients aged between 15 and 40 years, with a clinical diagnosis of Bell's palsy of less than six months' duration, and those who were able to follow instructions were included. Patients with upper motor neuron lesions, facial trauma, prior facial surgery, dermatological conditions

contra-indicating taping, or associated neurological or psychiatric disorders were excluded. The diagnosis of Bell's palsy was made clinically based on standard neurological and otolaryngological criteria.²² All participants provided written informed consent prior to enrollment in the study.

2.3 Sample Size and Randomization

A total sample size of 30 participants was determined based on feasibility and availability during the study period. Participants were randomly allocated into two equal groups ($n = 15$ each) using a simple randomization technique. Allocation concealment was ensured using sealed opaque envelopes to minimize selection bias.²⁰ Group A received kinesio taping combined with conventional facial exercises, whereas Group B received proprioceptive neuromuscular facilitation (PNF) along with mime therapy.

Due to the nature of the therapeutic interventions, blinding of participants and therapists was not feasible. However, outcome assessments were conducted by an independent evaluator who was not involved in the intervention process, thereby reducing assessment bias.

2.4 Intervention Protocol

Participants in Group A received kinesio taping applied to the affected facial muscles using standard application techniques as described by Kase et al.²³ The taping was performed with appropriate tension to facilitate weakened muscles, improve proprioceptive input, and enhance neuromuscular activation. In addition, participants performed conventional facial exercises targeting key muscle groups, including eye closure, eyebrow elevation, lip movements, and cheek activation.

Participants in Group B underwent neuro-facilitation therapy consisting of Proprioceptive Neuromuscular Facilitation (PNF) and mime therapy. PNF techniques were applied to stimulate neuromuscular responses through proprioceptive input, facilitating coordinated facial muscle activation and motor relearning.²⁴ Mime therapy included structured facial exercises combined with mirror feedback and emotional expression training aimed at improving facial symmetry and reducing synkinesis.¹²

Participants were monitored throughout the intervention period for any adverse events. No significant adverse effects were reported in either group, indicating that both kinesio taping and

neurofacilitation therapies are safe and well-tolerated interventions. All interventions were administered for a duration of six weeks, with five sessions per week, and each session lasting approximately 30–45 minutes.

2.5 Outcome Measures

Outcome measures were assessed at baseline (pre-intervention) and after completion of the six-week intervention period (post-intervention). Facial function was evaluated using the Sunnybrook Facial Grading System (SFGS), a validated and widely used tool that assesses resting symmetry, voluntary movement, and synkinesis.²⁵ Synkinesis severity was assessed using the Synkinesis Assessment Questionnaire (SAQ), which provides a patient-reported measure of abnormal facial movements.²⁶ Functional impairment was evaluated using the Facial Disability Index (FDI), which includes physical and social function subscales.²⁷

2.6 Statistical Analysis

Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version [22.0]. Descriptive statistics were expressed as mean \pm standard deviation. Within-group comparisons were performed using paired t-tests, while between-group comparisons were analyzed using independent t-tests. A p -value of less than 0.05 was considered statistically significant.

3. RESULTS

A total of 30 participants completed the study and were equally distributed into two groups ($n = 15$ each). No dropouts were reported (Table 1).

3.1 Baseline Characteristics

The mean age of participants in Group A was 25.73 ± 8.04 years, while in Group B it was 26.40 ± 8.92 years. There was no statistically significant difference in age distribution between the groups ($p = 1.000$), indicating baseline comparability. Gender distribution was also comparable between groups. Group A consisted of 11 females (73.3%) and 4 males (26.7%), while Group B included 10 females (66.7%) and 5 males (33.3%). No statistically significant difference was observed between groups ($p = 0.690$), confirming homogeneity. $AlCl_3$ group ($p < 0.0001$). Groups of intact animals receiving BHME extracts at 400 mg/kg displayed significantly higher step-through latency compared to the $AlCl_3$ group ($p < 0.0001$). Additionally, the results revealed no significant difference in step-through latency time between the control group and the $AlCl_3$ groups.

Table 1: Baseline demographic characteristics

Variable	Group A (n=15)	Group B (n=15)	Total (n=30)	p-value
Age (years)	25.73 ± 8.04	26.40 ± 8.92	26.07 ± 8.35	1.000
Female	11 (73.3%)	10 (66.7%)	21 (70.0%)	0.690
Male	4 (26.7%)	5 (33.3%)	9 (30.0%)	0.690

Values are presented as mean ± standard deviation (SD) for continuous variables and frequency (percentage) for categorical variables. Between-group comparisons were performed using the independent t-test for continuous variables and Chi-square/Fisher's exact test for categorical variables. A p-value < 0.05 was considered statistically significant.

3.2 Within-Group Analysis

Group A showed statistically significant improvement in all outcome measures following the intervention period. Specifically, the SFGS scores increased from 29.87 ± 3.25 to 53.40 ± 6.64 ($p < 0.001$), indicating marked improvement in facial symmetry and voluntary muscle control. The SAQ scores significantly decreased from 56.33 ± 12.79 to 36.44 ± 6.92 ($p < 0.001$), reflecting a reduction in synkinesis. Similarly, FDI-PF scores increased from 2025.83 ± 313.84 to 2299.46 ± 290.50 ($p < 0.001$), demonstrating enhanced functional ability. In addition, FDI-SF scores decreased from 2352.00 ± 359.43 to 2036.67 ± 304.04 ($p < 0.001$), indicating improvement in social and psychological aspects of facial disability (Table 2).

Group B also demonstrated improvement following the intervention; however, the magnitude of change was comparatively lower than Group A. The SFGS scores increased significantly from 30.07 ± 3.84 to 43.27 ± 5.54 ($p < 0.001$), indicating improvement in facial symmetry. The SAQ scores showed a significant reduction from 53.91 ± 12.61 to 46.83 ± 10.84 ($p < 0.001$), reflecting decreased synkinesis. Similarly, FDI-SF scores significantly decreased from 2616.00 ± 249.25 to 2396.00 ± 221.32 ($p < 0.001$), indicating improvement in social aspects of facial disability. In contrast, although FDI-PF scores increased from 1954.50 ± 605.01 to 2114.55 ± 338.60, this improvement did not reach statistical significance ($p = 0.297$) (Table 3).

3.3 Between-Group Differences (Change Scores)

Comparison of mean differences between groups revealed that Group A demonstrated significantly greater improvement across most outcome measures. The mean improvement in SFGS scores was significantly higher in Group A (23.53 ± 6.17) compared to Group B (13.20 ± 3.80) ($p < 0.001$). SAQ scores showed greater reduction in Group A (19.89 ± 8.03) than Group B (7.08 ± 4.48) ($p < 0.001$). FDI

physical function improvement was significantly higher in Group A (273.63 ± 65.72) compared to Group B (121.35 ± 149.47) ($p = 0.001$). Although improvement in FDI social function was greater in Group A (315.33 ± 87.66) than Group B (220.00 ± 171.38), the difference did not reach statistical significance ($p = 0.065$) (Table 4).

Kinesio taping combined with facial exercises demonstrated significantly greater improvement in facial symmetry, reduction in synkinesis, and functional recovery compared to neurofacilitation therapies. Although improvement in social function was higher in Group A, the difference did not reach statistical significance.

4. DISCUSSION

The present randomized controlled trial evaluated the comparative effectiveness of kinesio taping combined with conventional facial exercises versus neurofacilitation therapies (PNF and mime therapy) in patients with Bell's palsy. The findings validate that both interventions significantly improved facial function and reduced synkinesis; however, kinesio taping resulted in higher clinical outcomes across most parameters, particularly in facial symmetry, synkinesis reduction, and physical function. A key strength of this study is the demonstration of baseline comparability between groups, with no significant differences observed in demographic or clinical variables prior to intervention. This ensures that post-intervention differences can be attributed primarily to the therapeutic interventions rather than confounding factors, thereby strengthening the internal validity of the study.

Both treatment groups showed statistically significant improvements, indicating that rehabilitation-based interventions play a crucial role in the recovery of facial nerve function. This is consistent with previous studies demonstrating the effectiveness of physiotherapeutic approaches such as PNF, neuromuscular re-education, and facial exercises in improving facial symmetry and functional outcomes in Bell's palsy.²⁹⁻³¹

Table 2: Pre- and Post-Intervention comparison in Group A

Variable	Pre-Intervention	Post-Intervention	p-value
SFGS	29.87 ± 3.25	53.40 ± 6.64	<0.001*
SAQ	56.33 ± 12.79	36.44 ± 6.92	<0.001*
FDI-PF	2025.83 ± 313.84	2299.46 ± 290.50	<0.001*
FDI-SF	2352.00 ± 359.43	2036.67 ± 304.04	<0.001*

Values are expressed as mean ± standard deviation (SD) (n = 15). Within-group comparisons were performed using paired t-test. *p < 0.05, **p < 0.01, *p < 0.001 compared to baseline (pre-intervention) values.

Table 3: Pre- and Post-Intervention comparison in Group B

Variable	Pre-Intervention	Post-Intervention	p-value
SFGS	30.07 ± 3.84	43.27 ± 5.54	<0.001*
SAQ	53.91 ± 12.61	46.83 ± 10.84	<0.001*
FDI-PF	1954.50 ± 605.01	2114.55 ± 338.60	0.297
FDI-SF	2616.00 ± 249.25	2396.00 ± 221.32	<0.001*

Values are expressed as mean ± standard deviation (SD) (n = 15). Within-group comparisons (pre- vs post-intervention) were performed using paired t-test. *p < 0.05 was considered statistically significant.

Table 4: Comparison of mean differences between groups

Variable	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
SFGS Improvement	23.53 ± 6.17	13.20 ± 3.80	<0.001*
SAQ Reduction	19.89 ± 8.03	7.08 ± 4.48	<0.001*
FDI-PF Improvement	273.63 ± 65.72	121.35 ± 149.47	0.001*
FDI-SF Reduction	315.33 ± 87.66	220.00 ± 171.38	0.065

Values are expressed as mean ± standard deviation (SD). Between-group comparisons were performed using independent t-test. *p-value < 0.05 was considered statistically significant.

However, the magnitude of improvement was significantly greater in the kinesio taping group, suggesting an added therapeutic benefit beyond conventional neurofacilitation techniques.

The better outcomes observed with kinesio taping may be explained by its continuous sensory stimulation and proprioceptive facilitation mechanisms. Unlike PNF and mime therapy, which rely on intermittent therapist-guided sessions, kinesio taping provides sustained cutaneous input, enhancing neuromuscular activation and promoting motor relearning throughout daily activities.³² This continuous feedback likely contributes to improved muscle coordination, reduced synkinesis, and enhanced functional recovery.

Furthermore, kinesio taping may improve local circulation and lymphatic drainage, thereby reducing edema and facilitating tissue healing.³³ The mechanical lifting effect of the tape is believed to reduce pressure on subcutaneous structures, which may further support recovery of facial nerve function. These mechanisms collectively explain the greater improvement in SFGS and SAQ scores observed in Group A.

In contrast, PNF and mime therapy primarily target motor control and voluntary muscle

activation, which, although effective, may require longer duration and higher patient compliance to achieve comparable results.³⁴ The relatively lower improvement observed in Group B, particularly in physical function (FDI-PF), may reflect the limitations of intermittent therapeutic input and the absence of continuous proprioceptive stimulation.

An interesting finding of this study was that although improvement in FDI social function was greater in the kinesio taping group, the difference between groups did not reach statistical significance. This may be attributed to the multifactorial nature of social function, which is influenced not only by physical recovery but also by psychological, emotional, and social factors.³⁵ These aspects may require longer follow-up duration or additional psychosocial interventions to demonstrate significant differences.

From a clinical perspective, the findings of this study highlight the importance of integrating non-pharmacological, patient-friendly, and low-risk interventions into the management of Bell's palsy. Kinesio taping offers several advantages, including ease of application, cost-effectiveness, non-invasiveness, and minimal adverse effects. These characteristics align well with the principles of

alternative and integrative therapies, particularly in conditions requiring long-term rehabilitation.

Importantly, no adverse effects were reported in either group, supporting the safety and tolerability of both interventions. This is particularly relevant in the context of therapeutic optimization and patient-centered care, where minimizing treatment-related risks is essential.

Despite these promising findings, certain limitations must be acknowledged. The sample size was relatively small, which may limit the generalizability of the results. Additionally, the study duration was limited to six weeks, which may not fully capture long-term outcomes or recurrence rates. Future studies with larger sample sizes, longer follow-up periods, and inclusion of objective electrophysiological measures are recommended to further validate these findings.

5. CONCLUSION

This randomized controlled trial demonstrates that both kinesio taping and neurofacilitation therapies are effective in improving facial function and reducing synkinesis in patients with Bell's palsy; however, kinesio taping combined with conventional facial exercises showed significantly superior outcomes in terms of facial symmetry, functional recovery, and reduction of synkinesis. The enhanced effectiveness of kinesio taping may be attributed to its continuous proprioceptive stimulation and facilitation of neuromuscular activation. Given its non-invasive nature, ease of application, and favorable safety profile, kinesio taping represents a promising alternative and adjunctive rehabilitation strategy in the management of Bell's palsy. Further large-scale studies with long-term follow-up are warranted to confirm these findings and establish standardized clinical protocols.

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