



EFFECTIVENESS OF KABAT'S THERAPY IN THE MANAGEMENT OF BELL'S PALSY: A RANDOMISED CONTROLLED TRIAL

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INTRODUCTION

A human's face is a very integral part of his identity and uniqueness. Facial expressions play a crucial role in expressing emotions and in social interactions, thus any defect in facial muscle control, besides physical disability creates social and psychological distress.¹ Bell's palsy is an acute-onset peripheral facial neuropathy and is one of the most frequent causes of lower motor neuron facial paralysis. Bell's palsy is named after Sir Charles Bell (1774-1842) who was first to present the anatomical basis.² The first case report of idiopathic facial paralysis is believed to have been published by an 18th-century medicine professor, Nicolaus Friedrich, in Wurzburg. Later, Charles Bell studied facial nerve function in animals. He encountered several unilateral facial nerve paralysis cases during his surgical practice in London. His most well-known and widely cited case of facial palsy was posted in 1828, in which he presented a matter of a man hit by a bull and the resulting injury caused perpetual facial nerve paralysis.³

Bell's palsy is implicated in 60 to 75% of the all cases of facial paralysis. Every year, 7 to 40 cases occur per 100,000 people, the prevalence being similar in both genders. The cause remains idiopathic but strongly associated with certain viral infections, resulting in nerve inflammation causing focal edema, demyelination, and ischemia. According to various studies, certain risk factors like increased blood sugar, uncontrolled blood pressure, severe pre-eclampsia, migraine, and radiation exposure aid in the pathologic processes and make an individual more prone to palsy.^{1,4-7} The weakness could be complete or partial and may be associated with numbness, mild pain, enhanced sound sensitivity, and alteration in taste. The diagnosis is one of exclusion and is primarily determined based on physical examination.¹

Oral corticosteroids, such as prednisone, reduce nerve swelling and might improve facial motions and expressions faster. This treatment is most efficacious when it is started within 48 hours of noticing symptoms. Various nonpharmacologic measures like physiotherapy, including facial exercises, neuromuscular retraining, and acupuncture, are also implied in treating Bell's palsy and are reported to hasten recovery.¹

Physiotherapy plays a vital role in improving functional outcomes, particularly in cases where full recovery is delayed. Techniques such as facial proprioceptive neuromuscular facilitation (PNF) and electrical stimulation have shown benefit in promoting symmetrical facial movement and reducing synkinesis. The Mirror Effect Plus Protocol and structured facial exercises have demonstrated promising long-term outcomes. Physiotherapy interventions such as electrotherapy, massage,

therapeutic exercise, patient feedback and heat therapy have been shown to accelerate recovery, improve facial functioning and reduce complications. Furthermore, they can maintain muscle tone and nerve stimulation of facial muscles which is essential for patients with BP. Physiotherapy techniques that aim to retrain the muscles help prevent the formation of muscle contractures and prevent atrophy of the facial muscles. Recent data suggest that, physiotherapy has many benefits in the rehabilitation of patients with Bell's palsy, as the results of studies have shown a great improvement in facial function and faster recovery. Additionally, they showed that patients who performed either a program with the PNF method for six weeks or with the Kabat technique for three weeks in combination with nerve stimulation had an improvement in facial symmetry.⁸

Kabat rehabilitation consists in the facilitation of the voluntary response of an impaired muscle through the global pattern of an entire muscular section that undergoes resistance. This method appears to be extremely rational for facial muscles, since most of the face muscular fibers run diagonally, with easy irradiation to the upper facial region due to the cross-FN innervations. Three regional fulcra were taken into consideration: upper, intermediate and lower fulcrum. The first (forehead and eyes) is connected via a vertical axis to the intermediate one (nose), while the lower mimic-chewing-articulatory fulcrum lies along the horizontal axis. Hence, action on the upper fulcrum also involves the other two fulcra. The manipulation of these three fulcra is carried out by utilising both contralateral contractions and basic proprioceptive stimulation, including stretching, maximal resistance, manual contact and verbal input. In the upper fulcrum, the activation of the frontal, corrugators and orbicularis muscles is carried out by their upwards or downwards traction, which is always in a vertical plane depending on the specific function that needs to be activated. In the intermediate fulcrum, activation of the common elevator muscle of the ala nasi and the upper lip is also carried out using traction movements, in this case contrary to the normal direction, following a vertical line. For the lower fulcrum, the maneuvers are carried out on the risorium and orbicularis oris muscles in a horizontal plane, and on the mentalis muscle in a vertical plane.⁹

However, the effect of Kabat therapy remains unknown among Indian patients.¹⁰ Hence the present study was planned to determine the KABAT therapy when combined with conventional treatment on recovery process in Bell's palsy cases.

METHODS

The randomized controlled trial was conducted at a physiotherapy rehabilitation clinic of a tertiary care hospital and physiotherapy institute situated in South India over a period of 18 months from January 2023 to June 2025. Prior to the commencement ethical clearance was obtained. A total of 60 participants of either sex aged above 18 years with clinical diagnosis of Bell's palsy referred to outpatient department were enrolled. Medically stable participants having ability to follow commands with clinical diagnosis of lower motor neuron Bell's palsy having partial or complete facial muscle weakness based on House Beckman grading (grade II to V) were included in the study. Participants, with traumatic facial palsy, other cranial nerve problems, pregnant women, upper motor neuron facial palsy, skin infection, herpes over face, severe synkinesis, cognitive impairment and contraindications to facial stimulation were excluded from the study.

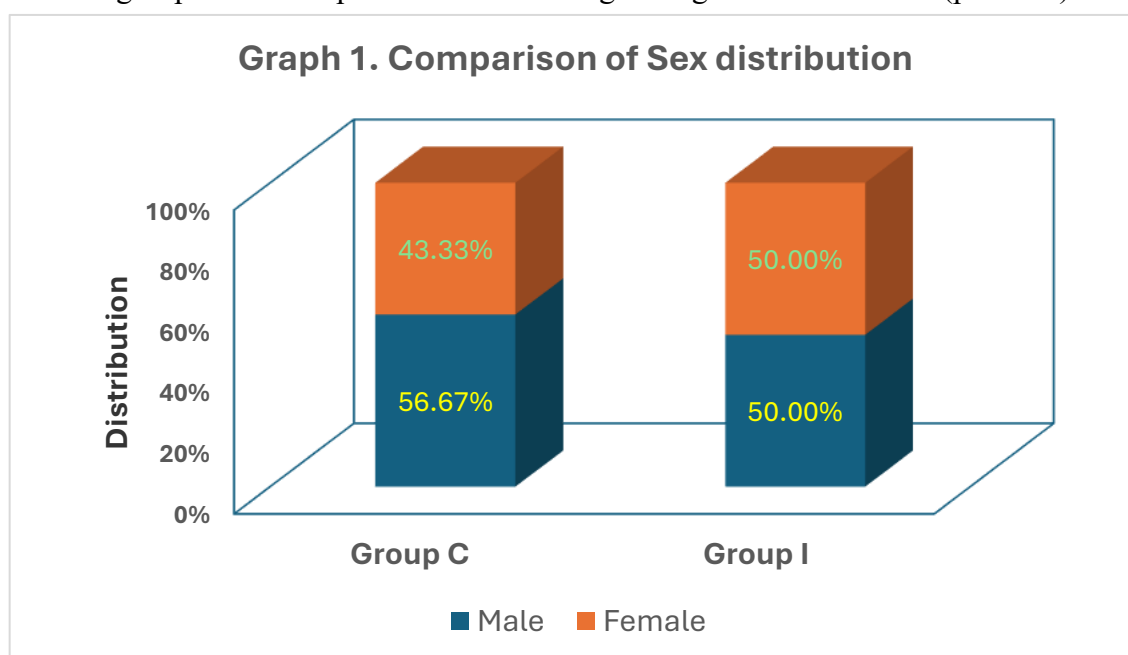
Eligible participants willing to participate in the study with consenting to take intervention for three weeks were enrolled after obtaining written informed consent. Patients' demographic data was obtained and initial assessment was done based on HB grading system.^{11,12} The participants were randomly assigned to either control (Group C) or intervention group (Group I). Participants in control group were treated with Galvanic stimulation and exercises in front of mirror on successive days for three weeks. In intervention group, participants underwent Galvanic stimulation and facial exercise in front of mirror with Kabat exercise program. Both the groups were treated for three weeks. After the intervention both the groups were evaluated for outcome based on HB scale and Sunny Brook facial grading (SFGS) scale.¹³

Statistical Analysis

The data obtained was coded and entered into Microsoft Excel Worksheet (Annexure III). The data was analyzed using statistical software SPSS version 20.0. Continuous variables were expressed in terms of mean $\pm$ standard deviation (SD) for the data that followed normal distribution and the data which followed skewed distribution was expressed as median and interquartile range (IQR). Categorical data was expressed in terms of rates, ratios and percentages. The comparison of demographic data was done by chi square test or Fisher's exact test depending on distribution pattern. The comparison between groups was done by independent sample 't' test. The continuous data was tested for distribution based on Shapiro Wilk test. The pre and posttest outcomes in terms of HB grade^{11,12} and SBFG scale were done using paired sample t test and inter group comparison after intervention was done using independent sample t test. At 95% confidence interval, probability value of <0.050 was considered as statistically significant.

RESULTS

The age and sex distribution pattern of the patients in group C and I is as shown in graph 1 and 2. Both the groups were comparable in terms of age and gender distribution ($p>0.050$).



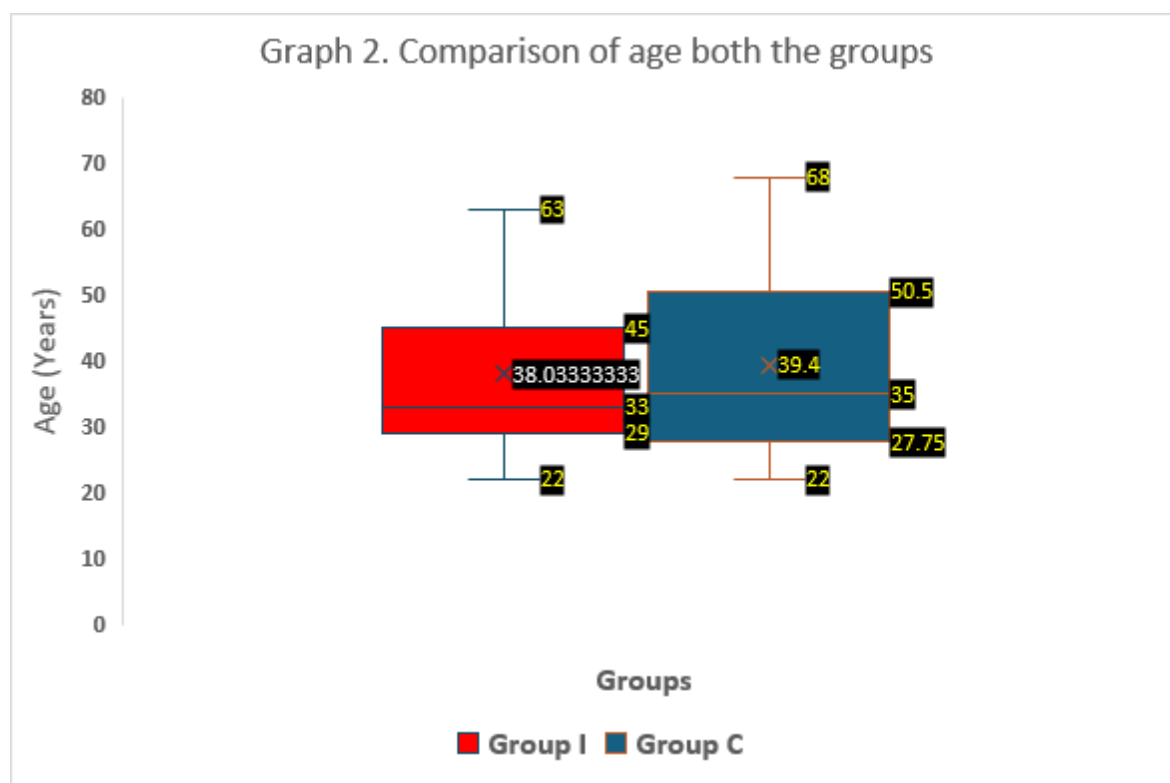


Table 1. Distribution of patients according to the HB grade at enrolment

HB grade	Group C		Group I	
	Number	Percentage	Number	Percentage
III	15	50.00	4	13.33
IV	8	26.67	14	46.67
V	7	23.33	12	40.00
Total	30	100.00	30	100.00

p=0.012

Table 2. Comparison of SFGS score at enrollment

Parameters	Group C (n=30)		Group I (n=30)		p value
	Mean	SD	Mean	SD	
SFGS score	44.16	10.07	36.06	3.57	<0.001

The HB and SFGS score at enrolment is as depicted in table 1 and 2. It was observed that, significantly higher number of participants in group I had grade V HB score compared to group C. Similarly, the mean SFGS score among the participants in group I was significantly low compared to group C.

Table 3. Comparison of HB grade after intervention

HB grade	Group C		Group I	
	Number	Percentage	Number	Percentage
III	15	50.00	20	66.67
IV	15	50.00	8	26.67
V	0	0.00	2	6.67
Total	30	100.00	30	100.00

p=0.072

Table 4. Comparison of HB grade before and after intervention

HB grade		Before (n=30)		After (n=30)		P value
		Number	Percentage	Number	Percentage	
Group I	III	4	13.33	20	66.67	<0.001
	IV	14	46.67	8	26.67	
	V	12	40.00	2	6.67	
Group C	III	15	50.00	15	50.00	<0.001
	IV	8	26.67	15	50.00	
	V	7	23.33	0	0.00	

The comparison of HB grade after intervention between group C and I is as shown in table 3. After intervention, grade III HB was noted in 66.67% of the patients in group I compared to 50% in group C but the difference was statistically not significant ($p=0.072$). Further, within the group C and I significantly higher number of participants had grade III HB score (Table 5).

Table 5. Comparison of SFGS score

Interval	Group C (n=30)		Group I (n=30)		*p value
	Mean	SD	Mean	SD	
At enrolment	44.16	10.07	36.06	3.57	<0.001
after intervention	86.7	2.81	89.53	1.630	<0.001
percentage change (%)	105.95	45.8	150.6	25.400	<0.001
#p value	<0.001		<0.001		

*: inter group comparison; #: Intra group comparison;

The comparison of SFGS score before and after intervention is as depicted in table 5. It was observed that, the mean SFGS scores after intervention were significantly high in group C compared to group I but, intragroup comparison revealed significantly higher mean SFGS scores in both the groups. Further, the change in mean SFGS score was significantly high in group I.

Discussion

This small study on south Indian population shows that, KABAT therapy combined with conventional treatment that is, galvanic stimulation and facial exercise in front of mirror has significant benefits in terms functional recovery among the participants with Bell's palsy especially those with lower motor neuron facial palsy after controlling age and gender.

In the present study nearly half of the participants (50%) in both the groups were males. The median age of the participants in group control and intervention group was statistically comparable (35.00 [IQR 22.75] vs 33.00 [IQR 16.00]; $p=0.904$) suggesting that age and sex distribution pattern in both the groups was statistically similar ruling out the possible bias in the study results. The age distribution pattern in the present study was comparable with the observations reported in a similar study by Khanzada K. et al.¹⁴ (2018) from Lahore, Pakistan where the mean age of patients in intervention group was 35.85 ± 8.46 years, compared to 36.38 ± 8.34 years in control group.

In the present study at enrolment, significantly higher number of participants in intervention group had severe disease compared to those in control group based on HB grade as well as SFGS scores¹³ as the mean SFGS scores¹³ were significantly low in intervention group compared to the control group. Intervention in the form of galvanic stimulation and facial exercise in front of mirror with Kabat exercise program for three weeks showed significant improvement among the participants in intervention group than those in control group.

The posttest comparison of HB grade^{11,12} and SFGS score¹³ revealed significant improvement in both the groups (as all the patients in both the groups had improvement as all the participants had

lower HB grade^{11,12} after intervention in both the groups), suggesting that addition of Kabat exercise program had no significant benefit but, the comparison of pre and posttest SFGS scores¹³ revealed significantly higher scores among the participants in intervention group. Also, the change in SFGS score¹³ after the intervention among the participants in intervention group was significantly high. Furthermore, the comparison of mean percentage change in SFGS score¹³ from pre to posttest evaluation reflected significantly higher percentage (> 45% in intervention group compared to control group) change in intervention group suggesting that the intervention has significant benefit. Another aspect worth mentioning is that the posttest comparison of HB grades^{11,12} resulted in lack of significant effect of intervention although, majority of the participants in intervention group improved to grade III (66.67%) from grade V and IV (>85%). This intriguing observation may be explained by the fact that, the participants in intervention group had severe disease profile compared to those in control group that is, majority of the cases (>85%) presented with HB grade^{11,12} IV and V Bell's palsy while, in control group majority of the cases had HB grade^{11,12} III Bell's palsy at enrolment (50%). Interestingly, the intervention was highly effective as majority of participants with severe disease (HB grade^{11,12} IV and V) were improved to grade III. This effect failed to reflect on posttest comparison of HB grade^{11,12} as both the groups were not matched for disease profile.

Another important aspect worth mentioning is that, the results of the present study showed improvements based on SFGS grading which is highly reliable and reproducible according to previous studies. Kanerva M. et al.¹⁵ (2021) compared the clinical applicability of the HBGS, Facial Nerve Grading System 2.0 (FNGS),¹⁶ and SFGS¹³ in the assessment of facial nerve palsy and demonstrated that the SFGS¹³ was the most applicable as it was able to regionally assess variables such as voluntary movement, static symmetry, and joint banding phenomena. Previous studies^{15,17} have shown that the SFGS¹³ demonstrates a high degree of reproducibility among experienced clinicians and novices, with minimal inter- and intra-rater variability, as well as excellent internal validity and sensitive change detection. More recently Lin Z. et al.¹⁸ (2025) also similar results.

Overall, the present study demonstrated significant benefits of KABAT therapy combined with conventional treatment that is, galvanic stimulation and facial exercise in front of mirror among the participants with Bell's palsy especially those with lower motor neuron facial palsy. The direct comparison of this observation noted in the present is not possible due to methodological differences (varied sample size, different combination therapies and disease profile). But in principle previous studies also have shown positive effect of addition of KABAT therapy in rehabilitation of patients with Bell's palsy.

Khanzada K. et al.¹⁴ (2018) in their study from Lahore, Pakistan showed that, Kabat technique is more effective as compared to facial exercise technique in improving physical and social function. In their study, 52 patients were taken. In Group-A (n=26), Kabat rehabilitation technique along with nerve stimulation was done on patients. In Group-B (n=26), facial exercises were performed along with nerve stimulation. Patients were included randomly in these two groups using blind concealment method. Pretest measurements were taken before and after the intervention with the help of SFGS and FDI. Paired sample t-test showed significant improvement ($p < 0.001$) in both study groups. The comparison of SFGS scores¹³ and FDI scores for pretreatment and posttreatment also revealed significant improvement ($p < 0.001$) in treating Bell's palsy and improving physical and social function in both study groups. The result shows both the treatment techniques, Kabat rehabilitation, and facial exercises were effective regarding treating Bell's palsy and increasing physical and social function as there was no significant difference between the two groups. Pretreatment values for SFGS score¹³ and FDI varied insignificantly across the two treatment group with $P > 0.05$; however, by the end of the treatment sessions, there were significant differences between the two study groups with value of $P < 0.05$ and thus, it showed that both techniques statistically significant; however, their mean difference shows that Kabat technique is clinically superior to facial exercise technique in treating Bell's palsy and improving physical and social function of patients. Overall, it was concluded that nerve stimulation with Kabat techniques was found to be more effective than the nerve stimulation with facial exercises in patients with Bell's palsy. and despite methodological differences this is in agreement with the present study.

Barbara M et al.¹⁹ (2010) conducted a study on the effects of Kabat rehabilitation in patients affected by Bell's palsy, showed that the clinical outcomes of patients improved and showed better and faster recovery. Again, these observations are strongly in agreement with the present study. This study had certain limitations. First, the disease severity of the patients in both the groups was significantly different which limited the study to prove the true effect of intervention. Second, the results of this study were based on a relatively smaller sample size selected from single centre which limits the generalizability of the results to entire population. Further multicentric studies with large sample size after controlling not only disease severity but other risk factors may provide the true benefits of Kabat rehabilitation.

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