Effectiveness of kabat technique versus mirror book therapy on unilateral facial function in patients with acute bell's palsy: a comparative study

[1]Lute Neha Datta, [2]Dr. Smita Mundhe (PT)
[1]Intern, [2]Assistant Professor (Neuro Physiotherapy)
[12]Department of Neuro Physiotherapy
[12]Maharashtra Institute of Physiotherapy, MAEER Pune's, Latur, Maharashtra, India

Abstract*—Background: Bell's palsy is an acute lower motor neuron condition involving unilateral facial nerve weakness that can affect facial expression, symmetry, eye closure, communication and social interaction. Kabat technique and Mirror Book Therapy are physiotherapy approaches used to facilitate facial muscle activity and improve facial function. Aim: To compare the effects of Kabat technique and Mirror Book Therapy on unilateral facial function in patients with acute Bell's palsy. Methods: This comparative experimental study included 32 participants allocated into two groups of 16. Group A received Kabat technique and Group B received Mirror Book Therapy for three weeks. Both groups also received the baseline electrical muscle stimulation protocol described in the project. Facial function was assessed before and after intervention using the Sunnybrook Facial Grading System. Data were analysed using the Shapiro–Wilk test, Wilcoxon signed-rank test and Mann–Whitney U test. Results: Mean Sunnybrook scores increased from 10.94 ± 7.51 to 75.50 ± 19.90 in the Kabat group and from 24.81 ± 21.37 to 59.31 ± 17.43 in the Mirror Book Therapy group. The mean changes were 64.56 ± 16.64 and 34.50 ± 13.78, respectively. Within-group improvements were statistically significant in both groups ($p < 0.001$), and the between-group comparison of change scores was also statistically significant ($U = 229.0$, $p < 0.001$). Conclusion: Both interventions were associated with improved Sunnybrook scores over three weeks. A larger mean improvement was reported in the Kabat group; however, baseline age imbalance and age-eligibility discrepancies in the master chart require verification before drawing a definitive comparative conclusion.

***Index Terms*—Bell's palsy, Kabat technique, Mirror Book Therapy, facial function, Sunnybrook Facial Grading System, physiotherapy**

I. Introduction

Bell's palsy is an acute idiopathic peripheral facial nerve palsy characterized by unilateral lower motor neuron facial weakness. It may affect facial expression, eye closure, oral competence and social interaction [1], [5], [14]. Although spontaneous recovery is common, the degree and rate of recovery vary, and residual weakness or synkinesis may affect function and quality of life [2], [6].

The facial nerve supplies the muscles of facial expression and contributes to functions including eye closure and oral movement. Patients may present with reduced or absent forehead wrinkling, loss of the nasolabial fold, drooping of the angle of the mouth and difficulty closing the eye on the affected side. Physiotherapy-based facial rehabilitation aims to facilitate controlled movement, maintain symmetry and support motor relearning.

Kabat rehabilitation, also described as proprioceptive neuromuscular facilitation, uses proprioceptive input, manual contacts and graded resistance to facilitate selective facial muscle activity. Mirror Book Therapy provides visual feedback by allowing the patient to observe the unaffected side as a reference for facial

movement. Previous reports have described the use of Kabat-based rehabilitation and mirror-based feedback in facial palsy [11]–[13].

The present study compares Kabat technique with Mirror Book Therapy for unilateral facial function in patients with acute Bell's palsy, using the Sunnybrook Facial Grading System as the outcome measure.

II. Aim and Objectives

The aim was to compare the effects of Kabat technique and Mirror Book Therapy on unilateral facial function in patients with acute Bell's palsy after three weeks of intervention.

The objectives were to evaluate the effect of Kabat technique, evaluate the effect of Mirror Book Therapy, and compare the changes in facial function between the two groups.

III. Materials and Methods

A. Study design and setting

The project described an experimental comparative study conducted in the Neuro Physiotherapy Outpatient Department of Maharashtra Institute of Physiotherapy, Latur. The stated study duration was six months, with an intervention period of three weeks.

B. Participants and sampling

The project reported a sample of 32 participants, with 16 participants in each group, selected using simple random sampling. The stated inclusion criteria were acute unilateral Bell's palsy, both genders, diagnosis within one to three weeks, willingness to participate, age between 25 and 50 years, and facial muscle manual muscle testing grade 1 to 4. Exclusion criteria were uncooperative patients, central nerve palsy, neurological, mental or psychological disorders, upper motor neuron facial paralysis, and open wounds or ulcers around the mandible.

C. Procedure

Ethical committee permission was reported as having been obtained before commencement. The study purpose and procedure were explained to participants and written informed consent was obtained. Participants were screened against the stated criteria, underwent an initial neurological examination and baseline assessment using the Sunnybrook Facial Grading System, and were allocated to one of two groups. Group A received Kabat technique and Group B received Mirror Book Therapy for three weeks. Facial function was reassessed after the intervention.

D. Intervention

Group A—Kabat technique: Exercises targeted the frontalis, orbicularis oculi, corrugator, procerus, zygomaticus major, orbicularis oris and buccinator. Participants practised movements such as raising the eyebrows, closing the eyes, frowning, wrinkling the nose, smiling, pursing the lips and drawing in the cheeks. The therapist applied gentle, direction-specific manual resistance as described in the project protocol.

Group B—Mirror Book Therapy: Participants sat upright and positioned the mirror vertically at eye level, with the nose touching the outer edge at approximately a right angle. Exercises were performed with natural support and without forced or exaggerated expressions. The listed exercises were raising the eyebrows, pulling the eyebrows down, pursing the lips, puckering the lips and smiling. Each movement was held for five seconds and repeated 10 times.

Baseline treatment in both groups: The project recorded electrical muscle stimulation as common baseline treatment. Interrupted galvanic stimulation was described for facial muscles (two sets of 45 contractions for each muscle), and surged faradic stimulation was described for the facial nerve trunk (two sets of 15 contractions for each trunk).

E. Outcome measure

The Sunnybrook Facial Grading System was used to assess facial function before and after the three-week intervention. The project did not report additional outcome measures for the present analysis.

F. Statistical analysis

Data were analysed using SPSS version 20.0. The significance level was set at 0.05. Normality was assessed using the Shapiro–Wilk test. Mean and standard deviation were used to describe continuous data. The Wilcoxon signed-rank test was used for within-group pre- and post-intervention comparisons, and the Mann–Whitney U test was used to compare change scores between groups.

IV. Results

The supplied master chart contained 32 records, with 16 participants in each group. The demographic summaries and Sunnybrook score summaries reported in the project are presented below.

Table I. Participant characteristics

Characteristic	Kabat (n = 16)	Mirror Book (n = 16)
Age, years (mean ± SD)	32.56 ± 11.47	40.75 ± 6.34
Male, n (%)	11 (68.8%)	13 (81.3%)
Female, n (%)	5 (31.3%)	3 (18.8%)
Left affected side, n (%)	9 (56.3%)	5 (31.3%)
Right affected side, n (%)	7 (43.8%)	11 (68.8%)

The mean age differed between groups (independent-samples t-test, p = 0.018). The project reported no statistically significant difference in gender distribution (p = 1.000). The affected-side p value was inconsistent between the demographic table and accompanying narrative; therefore, it is not reproduced here.

Table II. Shapiro–Wilk normality assessment

Group	Score	W	p value	Interpretation
Kabat	Pre	0.921	0.174	Approximately normal
Kabat	Post	0.831	0.007	Non-normal
Kabat	Change	0.843	0.011	Non-normal

Mirror Book	Pre	0.819	0.005	Non-normal
Mirror Book	Post	0.892	0.060	Approximately normal
Mirror Book	Change	0.949	0.471	Approximately normal

Selected distributions were non-normal ($p < 0.05$); non-parametric tests were therefore used for the primary Sunnybrook comparisons.

Table III. Within-group Sunnybrook score comparison

Group	Pre mean ± SD	Post mean ± SD	Mean change ± SD	Wilcoxon W	p value
Kabat	10.94 ± 7.51	75.50 ± 19.90	64.56 ± 16.64	0	<0.001
Mirror Book	24.81 ± 21.37	59.31 ± 17.43	34.50 ± 13.78	0	<0.001

Sunnybrook scores increased significantly in both groups. In the Kabat group, the mean score increased from 10.94 ± 7.51 to 75.50 ± 19.90, with a mean change of 64.56 ± 16.64 (Wilcoxon $W = 0$, $p < 0.001$). In the Mirror Book Therapy group, the mean score increased from 24.81 ± 21.37 to 59.31 ± 17.43, with a mean change of 34.50 ± 13.78 ($W = 0$, $p < 0.001$).

Table IV. Between-group comparison of change scores

Outcome	Kabat change	Mirror Book change	Mann–Whitney U	p value
Sunnybrook score	64.56 ± 16.64	34.50 ± 13.78	229.0	<0.001

The difference in change scores between groups was statistically significant ($U = 229.0$, $p < 0.001$), with a larger mean improvement reported in the Kabat group. Baseline Sunnybrook scores also differed between groups (Kabat 10.94 ± 7.51; Mirror Book 24.81 ± 21.37; $U = 67.5$, $p = 0.023$). Post-intervention scores differed between groups ($U = 186.0$, $p = 0.029$).

V. Discussion

The present study compared Kabat technique and Mirror Book Therapy for improving unilateral facial function in acute Bell's palsy. Sunnybrook scores increased after three weeks in both groups, indicating improvement during the intervention period. The mean change was larger in the Kabat group than in the Mirror Book Therapy group, and the reported between-group comparison of change scores was statistically significant.

The improvement observed with Kabat technique may be related to proprioceptive stimulation, therapist-applied resistance and selective facilitation of facial muscles. The project's cited literature describes beneficial effects of Kabat-based rehabilitation in facial palsy [11]. Mirror Book Therapy provides visual feedback that may help patients observe and practise controlled facial movements. Previous publications have described mirror book therapy and face-mirroring approaches for idiopathic facial palsy [12], [13].

The results should be interpreted cautiously. Acute Bell's palsy may improve spontaneously, and the study did not include a no-treatment control group. In addition, the groups differed in mean age at baseline, and the baseline Sunnybrook scores were also different. The supplied master chart contains ages below the stated inclusion range of 25–50 years. These discrepancies may affect the interpretation of the comparison and should be resolved by checking the original participant records and statistical dataset.

The present findings are limited to the Sunnybrook score over a three-week period. They do not establish long-term recovery, prevention of synkinesis or electrophysiological changes.

VI. Limitations

The sample size was small and the study was conducted in a single clinical setting. The intervention and follow-up period was short. Spontaneous recovery may have contributed to the observed changes. Long-term follow-up was not reported. The age-eligibility discrepancy in the master chart and baseline differences between groups further limit interpretation.

VII. Conclusion

Both Kabat technique and Mirror Book Therapy were associated with statistically significant improvements in Sunnybrook Facial Grading System scores after three weeks when provided alongside the common baseline treatment described in the project. The reported mean improvement was greater in the Kabat group, and the between-group change-score comparison was statistically significant. However, baseline differences and inconsistencies in the participant age records must be verified before concluding that Kabat technique is definitively superior.

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