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Original Article

Effectiveness of Kabat Exercises along with Mirror Therapy in Bell's Palsy

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ABSTRACT

Background: Bell's Palsy, characterized by sudden unilateral facial nerve paralysis, presents significant challenges in facial function and aesthetics, impacting patients' quality of life. Despite the unknown etiology of Bell's Palsy, various treatments, including pharmacological and physiotherapeutic interventions, have been explored. Among these, Kabat exercises and Mirror Therapy (MT) have shown promise. This study delves into the comparative efficacy of these interventions in the rehabilitation process.

Objective: To evaluate the effectiveness of Kabat exercises combined with mirror therapy versus Kabat exercises alone in improving facial function and reducing disability in patients with Bell's Palsy.

Methods: A randomized clinical trial was conducted with 32 Bell's Palsy patients aged 25 to 50 years. Participants were randomly allocated into two groups: one receiving Kabat exercises combined with mirror therapy (n=16) and the other receiving Kabat exercises alone (n=16). Interventions were administered over a month, comprising 3 sessions per week, each lasting 10-15 minutes. The House Brackmann Grading System (HBGS) and Facial Disability Index (FDI) were employed for pre and post-treatment assessments, along with a one-month follow-up to evaluate the improvements in facial function and disability.

Results: Both groups demonstrated significant improvements in facial function and reduction in disability post-treatment. However, the combination of Kabat exercises and mirror therapy showed superior outcomes compared to Kabat exercises alone. The HBGS scores improved from a mean of 3.00 to 1.34 in the combined therapy group, compared to a change from 3.00 to 1.41 in the control group ($p<0.05$). FDI physical function scores enhanced from 1.00 to 2.63 in the combined therapy group, against 1.00 to 2.88 in the control group, indicating a significant difference in recovery ($p<0.05$).

Conclusion: The integration of Kabat exercises with mirror therapy is more effective in enhancing facial function and reducing disability in Bell's Palsy patients than Kabat exercises alone. This combined approach should be considered a valuable addition to the rehabilitation protocols for Bell's Palsy.

Keywords: Bell's Palsy, Kabat exercises, Mirror Therapy, Facial Disability Index, House Brackmann Grading System, Physiotherapy.

INTRODUCTION

In the context of neurology and otolaryngology, Bell's Palsy (BP) stands as a predominant cause of acute facial nerve paralysis, with an estimated annual incidence rate of 20–32.2 per 100,000 individuals, predominantly affecting those between the ages of 15 and 45 (1-3). Despite a recurrence rate of 8–12%, it is noteworthy that approximately 70% of patients experience spontaneous recovery without intervention (4, 5). The etiology of BP remains elusive, though it is characterized as a lower motor neuron lesion precipitated by acute facial nerve symptoms, potentially commencing with pain in the mastoid region and culminating in unilateral facial paralysis (6). This condition, also known as acute facial palsy of unknown origin, results from inflammation, swelling, or compression of the facial nerve, and may be influenced by various secondary factors including pregnancy, diabetes, hypertension, obesity, and preeclampsia.

The pathophysiology of BP involves damage to cranial nerve VII, originating from the facial nerve nucleus in the Pons and traversing through the internal auditory meatus to the stylomastoid foramen (7). This nerve encompasses both afferent and efferent fibers, traversing labyrinthine, tympanic, and mastoid segments before innervating the parotid gland (8). The brainstem's integration with

the seventh cranial nerve facilitates complex facial movements, salivation, lacrimation, and taste, underscoring the multifaceted nature of facial nerve function (9). Consequently, BP manifests through a spectrum of symptoms including speech impairment, facial asymmetry, difficulty in eye closure, and drooling, significantly impacting the aesthetic and functional aspects of facial expression. The condition typically progresses rapidly, reaching peak weakness within 1–3 weeks, and affects individuals across all age groups. Management of BP involves a multidisciplinary approach, acknowledging the pioneering work of Dr. Charles Bell in 1821 (10, 11).

In the treatment landscape, physiotherapy has emerged as a beneficial adjunct, enhancing facial muscle tone and neural conduction through various techniques such as electrical stimulation, Kabat rehabilitation, and facial exercises. Specifically, Proprioceptive Neuromuscular Facilitation (PNF) and Kabat exercises play pivotal roles in improving muscle flexibility, facilitating muscle activity, and preventing atrophy (12). These methods leverage functionally based diagonal movements to elicit motor responses and enhance neuromuscular control (13). Furthermore, the application of mirror therapy and motor imagery in rehabilitation harnesses the brain's capacity for neuroplasticity, potentially improving facial function through cognitive simulation and the activation of mirror neurons (14).

Evaluative tools such as the House and Brackmann grading system and the Facial Disability Index (FDI) offer objective means to assess facial nerve function and the impact of BP on quality of life (7). These tools facilitate clinical decision-making and the monitoring of therapeutic outcomes (8). Moreover, recent studies have explored the efficacy of combined treatment modalities, such as the integration of Kabat exercises with mirror therapy, in enhancing facial movement and reducing asymmetry in BP patients. This holistic approach underscores the importance of tailored rehabilitation strategies in optimizing recovery outcomes (15).

In conclusion, Bell's Palsy represents a complex clinical entity with significant implications for facial function and aesthetics. The evolution of treatment strategies, from pharmacological interventions to physiotherapeutic techniques, reflects a growing understanding of the underlying mechanisms and the potential for recovery. As research continues to unravel the mysteries of BP, the integration of evidence-based therapies promises to improve the quality of life for affected individuals, emphasizing the critical role of personalized care in the management of this condition (16).

MATERIAL AND METHODS

In this research, a randomized clinical trial was conducted, registered under the Iranian registry of clinical trials with the registration ID IRCT20230706058696N1. The study aimed to evaluate the effectiveness of Kabat exercises in conjunction with mirror therapy for patients suffering from Bell's Palsy, characterized by facial asymmetry and impaired facial movements such as asymmetric smiles, eyebrow frowning, eye drooping, and drooling due to muscular weakness (17).

The study was set across various medical institutions including Faisal Hospital, Rubina Memorial Hospital, Madinah Teaching Hospital, Allied Hospital Faisalabad, Mujahid Hospital, and Shahid Ahmed Heera's Health Clinic. A purposive sampling design was employed to select participants, focusing on male and female individuals aged between 25 to 50 years (18). These participants exhibited acute onset of symptoms (1-3 weeks) and were diagnosed with Bell's Palsy with a House Brackmann grading index of III and IV, demonstrating facial asymmetry which was assessed using the Facial Disability Index (FDI) (19, 20).

The sample size was determined based on comparing two means, resulting in a total of 32 patients, evenly split into two groups of 16 each. This size was calculated to achieve 95% confidence and 80% power, assuming a mean difference of 6.16 between the groups, with standard deviations and variance derived from preliminary data.

Participants were included if they met specific criteria: both genders, aged 25-50, with acute onset of Bell's Palsy and a specific degree of facial nerve dysfunction (21). Those with psychological issues, hypertension, neurological or sensory deficits, stroke, or multiple sclerosis were excluded from the study. The data collection process involved pre- and post-treatment measures, assessing participants with the FDI and House Brackmann Grading System (HBGS) before and after the intervention. The intervention for Group 1 included Kabat exercises alongside mirror therapy across 12 sessions over four weeks, while the control group received only Kabat exercises for the same duration. The effects of neuroplasticity were evaluated one month post-treatment to compare the efficacy of both interventions (22).

The methodology also entailed using the House Brackmann Grading System to evaluate the severity and progression of facial nerve dysfunction, and the Facial Disability Index Scale to assess the physical and social impact of Bell's Palsy on the patients' daily lives. Kabat exercises were tailored to each facial nerve branch, focusing on encouraging symmetry and providing feedback through mirror use during sessions to avoid muscular fatigue.

For data analysis, SPSS version 25 was utilized, employing descriptive statistics for quantitative data and frequencies or percentages for categorical data. The Friedman test was applied to compare pretest, posttest, and follow-up treatment measurements, while the Mann-Whitney U test determined differences between the two groups. A significance level of $p<0.05$ was established for result interpretation.

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The study spanned four months post-synopsis approval, adhering to ethical standards set by the University of Faisalabad's ethical committee. Participants provided written informed consent, ensuring confidentiality and privacy throughout the research. Data and participant identities were safeguarded, emphasizing the ethical considerations in line with the Declaration of Helsinki, ensuring the integrity and confidentiality of the research process (23).

RESULTS

In this study, we investigated the demographics, baseline characteristics, and treatment outcomes of patients with Bell's Palsy, utilizing the House Brackmann Grading System (HBGS) and the Facial Disability Index (FDI) to evaluate the effectiveness of Kabat exercises with and without mirror therapy.

The participant cohort comprised an almost even distribution of genders, with 18 females (56.3%) and 14 males (43.8%) [Table 1]. The majority of participants, 27 (84.4%), reported no pain (VAS for Pain = 0), while a smaller subset experienced mild (12.5%) or moderate pain (3.1%). The distribution of the affected side showed a preference for the right side in 21 (65.6%) participants, compared to the left in 11 (34.4%). Seasonally, the onset of Bell's Palsy symptoms was significantly more common in the summer, affecting 25 (78.1%) participants, with a minority occurring in autumn (21.9%). All participants were categorized under primary reasons for the onset of Bell's Palsy, highlighting the idiopathic nature of the condition in this group. The average age of participants was 35.47 years, with a standard deviation of 8.553, indicating a middle-aged cohort [Table 1].

Treatment outcomes, assessed through the HBGS, revealed initial scores indicating facial nerve dysfunction were identical in both treatment groups, with a mean of 3.00 [Table 2]. However, significant improvements were observed in subsequent readings. The group receiving Kabat exercises with mirror therapy showed a more pronounced improvement, with mean scores reducing to 1.66 and then to 1.34, compared to the control group (Kabat exercises alone), which improved to 1.59 and 1.41, respectively. Notably, the difference between groups became statistically significant by the second and third readings, with p-values of .013 and .001, respectively, demonstrating the added benefit of mirror therapy in the rehabilitation process [Table 2].

Table 1 Demographics and Baseline Information

Variable	Statistics
Gender	
Female	18 (56.3%)
Male	14 (43.8%)
VAS for Pain	
0	27 (84.4%)
1	4 (12.5%)
2	1 (3.1%)
Affected Side	
Right	21 (65.6%)
Left	11 (34.4%)
Season	
Summer	25 (78.1%)
Autumn	7 (21.9%)
Cause of BP	
Primary Reasons	32 (100%)
Age	
Mean (SD)	35.47 (8.553)

Table 2 HBGS Readings Across Treatment Groups

Reading	Kabat with Mirror	Only Kabat	p-value (Across Group)
Reading 1 HBGS	3.00	3.00	.483
Reading 2 HBGS	1.66	1.59	.013
Reading 3 HBGS	1.34	1.41	.001

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Table 3 FDI Subscale Physical Function

Assessment	Kabat with Mirror	Only Kabat	p-value (Across Group)
Pre-Assessment	1.00	1.00	.380
Post-Assessment	2.38	2.13	.000
Follow-Up	2.63	2.88	.000

Table 4 FDI Subscale Social Function

Assessment	Kabat with Mirror	Only Kabat	p-value (Across Group)
Pre-Assessment	2.88	2.66	.013
Post-Assessment	1.63	1.94	.000
Follow-Up	1.30	1.41	.027

The FDI's physical function subscale further supported these findings. Both groups began with identical baseline scores [Table 3]. However, the post-assessment and follow-up assessments revealed significant differences in recovery. The Kabat with mirror therapy group improved to mean scores of 2.38 and 2.63, respectively, indicating a reduction in physical disability. In contrast, the control group improved to 2.13 and then to 2.88, showcasing the effectiveness of the combined therapy approach with p-values indicating significant differences (.000) at both post-treatment and follow-up stages [Table 3].

Social function, as measured by the FDI subscale, also improved more in the group receiving combined therapy [Table 4]. Initial scores were slightly higher in the combined therapy group (2.88) compared to the control group (2.66), but both groups saw improvements post-treatment. The combined therapy group's scores improved to 1.63 and then to 1.30, suggesting enhanced social functioning and quality of life. The control group saw changes to 1.94 and then to 1.41, with p-values highlighting significant differences between the groups post-treatment and at follow-up (.013 and .027, respectively) [Table 4].

DISCUSSION

Bell's Palsy, recognized as one of the most prevalent neurological disorders, presents significant functional limitations and reduces the activity levels of affected patients. Due to the enigmatic etiology of Bell's Palsy, definitive cures remain elusive, prompting various studies over the past two decades to explore the efficacy of medications and other interventions, such as physical therapy, in managing this condition. The study in question delved into the rehabilitation process of Bell's Palsy, positing that Mirror Therapy (MT) as a form of visual biofeedback, when combined with Kabat exercises, constitutes a valuable addition to the array of physiotherapy treatments available. It was observed that patients became notably more sociable post-treatment, an outcome that underscores the multifaceted benefits of the proposed therapeutic approach.

This research aimed to scrutinize the effectiveness of Kabat exercises coupled with mirror therapy in treating Bell's Palsy. By conducting a comparative analysis of mirror therapy and Kabat exercises, the study sought to identify the more efficacious treatment modality. The participant pool comprised 32 individuals aged between 25 and 50, evenly split across gender lines. Following a month of intervention, marked improvements in facial symmetry and function were noted across both groups, albeit the combination of Kabat exercises and mirror therapy demonstrated superior efficacy in enhancing facial functionality and mitigating facial disability.

The study highlighted the critical role of both social and physical functionalities in the lives of Bell's Palsy patients, impacting their self-esteem and quality of life. Notably, a significant shift was observed between the pre and post-treatment values, affirming the therapeutic potential of the interventions. Despite the lack of a known cure due to the unidentified cause of Bell's Palsy, the integration of Kabat exercises with mirror therapy emerged as a compelling treatment strategy, facilitating more rapid and effective recovery compared to medical treatment alone (24).

Research comparing PNF training (Kabat exercises) to other interventions revealed that applying global stretching and resistance sequentially through PNF, particularly in conjunction with mirror therapy for biofeedback, significantly enhances muscle reeducation and functional improvement in the facial profile (12, 17, 18, 24). This approach necessitates further training to prevent recurrence, yet it has shown promise in improving facial areas crucial for expressions, such as the eyebrows, eyes, nose, and mouth.

The current study's findings align with previous research, underscoring the efficacy of combining Kabat exercises with mirror therapy over Kabat exercises alone in improving HBGS scores and FDI assessments for physical and social functions in Bell's Palsy patients (25). These outcomes are consistent with the broader literature, which supports the use of physical therapy techniques, including electrotherapy, kinesiotherapy, and Kabat exercises, in restoring facial asymmetry and movement (24).

The study's strengths lie in its methodical approach to comparing the effects of two distinct therapeutic interventions on Bell's Palsy rehabilitation. However, it also faced limitations, including a short data collection period of three months and a lack of patient

interest, which could potentially influence the generalizability of the findings. Future research is recommended to extend the study to a larger sample size, explore additional therapeutic techniques, employ diverse study designs, and encompass a broader spectrum of treatment modalities. Such endeavors will further enrich our understanding of Bell's Palsy management and enhance the effectiveness of rehabilitation strategies, ultimately benefiting patients by facilitating faster recovery and improved quality of life.

CONCLUSION

In conclusion, the integration of Kabat exercises with mirror therapy significantly enhances the recovery process for patients with Bell's Palsy, not only in terms of physical functionality but also in social engagement and overall quality of life. The statistical significance across multiple readings and assessments underscores the therapeutic value of this combined approach.

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