



Effectiveness of Mime Therapy along with Electrical Stimulation in Facial Synkinesis with Communication Affection in Bell's Palsy Patients

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<p>KEYWORDS</p> <p>Bell's Palsy, Synkinesis, Communication affection, Mime therapy, video analysis software Kinovea, Communicative Participation Item Bank.</p>	<p>ABSTRACT:</p> <p>Objective: The objective of the study was to see the effectiveness of Mime therapy along with electrical stimulation for facial synkinesis with communication affection in Bell's Palsy patient.</p> <p>Methods: A total of 29 subjects were taken as one subject was not showing up for the follow-up. We selected these subjects according to inclusion criteria i.e., Acute Bell's Palsy case, 40 – 60 years, Cases with communication participation with synkinesis, Subjects with poor prognostic factor. We utilized the free video analysis software Kinovea that can track preselected points during movements and measure two-point distances off-line and with this we used Communicative Participation Item Bank as an outcome measure for communication affection. Patient consent form and filled questionnaire were collected from the subjects.</p> <p>Results: The data of 29 subjects were collected and analyzed. There was significant difference in pre-test and post-test which is seen in two muscles [orbicularis oculi, corrugator] but there were no significant changes in other muscles. For communication affection we checked for pre and post scores of CPIB scale and there is clear difference between pre and post scores as the P value is less than 0.001 it shows extremely strong evidence against the null hypothesis which is there is no effectiveness of Mime therapy with electrical stimulation in facial synkinesis with communication affection in Bell's Palsy Patients.</p> <p>Conclusion: As we performed our study on 29 subjects and the post CPIB mean value is 26.0 which is greater than the pre CPIB mean value 16.72. As there was significant change in two muscles [orbicularis oculi, corrugator] and in other muscles there is no significant change is seen, it is analyzed using video analysis software kinovea. From the results of the study, we can conclude that there is effectiveness of Mime therapy with electrical stimulation for synkinesis with communication affection.</p>
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INTRODUCTION

Bell's palsy is a facial paralysis of acute onset presumed to be due to non-suppurative inflammation of unknown etiology of the facial nerve within its canal above the stylomastoid foramen. It occurs any time from infancy to old age. However, it is more seen among younger population and males are more affected than females.

There is no sensory loss as the sensory branches arises from proximal part of the facial nerve whereas Bell's palsy involves the distal area of the nerve. The muscles that are paralyzed are frontalis, corrugator supercili, orbicularis oculi, nasalis, levator labi superioris and inferioris, risorius, buccinator, depressor labi orbicularis oris and mentalis. The facial nerve palsy is of sudden onset. The lesions are usually unilateral and rarely



bilateral. Frequently pain is at the onset in the ear, mastoid region, angle of the jaw or patient may have temporal headache which can be considered as a warning signal. A complete interruption of the facial nerve at the stylomastoid foramen results in paralysis of all muscles of expression. Upper and lower facial muscles are usually equally affected and voluntary, emotional and associated movements are involved.^[1]

When the patient attempts to close his eyes, his eyeball will move upward and slightly inward this is called as Bell's phenomenon. Eversion of the lower eyelid called as Ectoprism impairs absorption of tears which tend to overflow the lower eyelid. Retraction of mouth and pursing of the lip is not possible paralysis of buccinator leads to accumulation of food between the teeth and the cheek, there will also be dribbling of saliva from the corner of the mouth. Patient complains of heaviness or numbness of the face, taste is intact. Distortion of the mouth causes the tongue to deviate to the sound side when protruded thus giving false impression of the hypoglossal lesion.^[1]

When the inflammation process extends upwards to get the nerve affected above the point at which chorda tympani leaves it all the above symptoms occurs including the following symptoms:

- Loss of taste sensation in the anterior two third of the tongue is seen
- If the nerve to stapedius is involved then there is chances of developing hyperacusis
- If the geniculate ganglion or the motor nerve which is proximal to it, is involved then there is reduction in lacrimation. Infact lesion will also involve the VIII cranial nerve at this point
- When the return of the motor function begins the smoothened nasolabial fold deepens.
- Movement in one group of facial muscles results in contraction of all of the facial muscles. This is called as associated movements or synkinesis.^[1]

Synkinesis (AKA aberrant regeneration) occurs after injury to the facial nerve and it is a common sequela of facial palsy, the cause of the injury may be Bell's Palsy, Ramsay Hunt Syndrome (less common), surgical damage (eg. during surgical removal of an acoustic

neuroma), trauma (skull fractures) or other conditions causing facial paralysis. The type of synkinesis is commonly seen is described by combining the names of the two involved muscle groups, with the first part referring to the voluntary motor group and the second part referring to the involuntary muscle group. For instance:

1. Ocular-oral synkinesis is when voluntary eye contraction such as blinking or brow lifting elicits an involuntary mouth movement
2. Oral-ocular synkinesis is when an involuntary eye contraction accompanies a volitional mouth movement such as smiling and lip puckering.^[2]

Unilateral facial palsy has been accompanying to impaired communicative participation, with restrictions that are comparable with severe communication disorders such as laryngectomy, head and neck cancer, and amyotrophic lateral sclerosis. However, the relationship between synkinesis and communicative participation remains unclear.^[2]

Among patients with synkinesis, is there a correlation between disease-specific quality-of-life and communicative ability or dysfunction? Herein, we examined a group of patients with synkinesis for associations between communicative participation, measured using the CPIB.^[3]

There are several treatment protocols which are set to treat Bell's Palsy. Combination of these treatments seems effective in patients with Bell's Palsy as there goal is to regain facial symmetry, facial muscle strength, communication problems etc. Following are some treatment measures which we usually do

- Electrical Stimulation for Facial Muscles
- Neuromuscular retraining (NMR)
- Massage Therapy
- Facial PNF Techniques
- Mirror Therapy
- Mime Therapy etc.

In our study we will use Mime Therapy for facial synkinesis with communication affection. Mime therapy



is a type of physiotherapy. It was created to help patients who had limited or restricted facial movement or a lack of facial muscle control. The aim of mime therapy is to promote symmetry of the face at rest and through movement^[4]. Components of Mime therapy include: -

- 1) Specific exercises to co-ordination both facial halves and to decrease synkinesis
- 2) Expression exercises
- 3) Self massage of face and neck
- 4) Eye and lip closure exercises.

Breathing and relaxation exercises.

A quantitative facial movement assessment tool that would be easy-to-reproduce, fast, free, accurate, and reliable for a sufficient number of muscles remains an unmet need. Such a tool might help clinicians to quantify facial paresis at onset, during follow-up, and after interventions such as medical, surgical, and rehabilitative programs. In the present study we have used the free and open-source software Kinovea and selected specific facial markers to quantify movements of six key muscles. From standard subject videos, we measured normal resting facial distances and maximal excursions of the selected markers during movement.^[6]

It must be acknowledged that the latter reliability measurement also involved two video recordings and therefore also depended upon the first “interview” reliability. Thus, the true “intermarking” reliability (or lack thereof) was really shown in the difference between the first and the second reliability, a difference that proved particularly obvious in some measurements for zygomaticus, orbicularis oculi, orbicularis oris, and buccinator. Problems with speech in patients with facial paralysis are frequently noted by both clinicians and the patients themselves, but limited research exists describing how facial paralysis affects verbal communication. To assess how the participants functioned in various communication

settings, all participants completed the CPIB Short Form. The CPIB Short Form is a 10-item instrument derived from a longer, 46-item question bank and is intended for use in a clinical setting. The authors of the CPIB reported a strong correlation ($r = 0.971$) between the full-length CPIB and the CPIB Short Form and suggested that scores from the short form are nearly identical to the scores on the full-length item set^[7]

In the CPIB, the level of interference in communication is rated on a 4-point Likert scale (where not at all = 3, a little = 2, quite a bit = 1, and very much = 0). Total scores for the 10 items range from 0 (worst) to 30 (best). Higher scores are more favourable, as they reflect higher levels of communicative participation and, conversely, lower levels of interference with communication.^[7]

OBJECTIVES

1. To find out the effect of mime therapy with electrical stimulation for synkinesis using video analysis kinovea software in Bell’s Palsy patients.
2. To find out the effect of mime therapy with electrical stimulation for communication problem with synkinesis using CPIB scale.

MATERIALS AND METHODOLOGY

Study Type: Single Group Experimental study.

Sampling Procedure: Convenience Sampling

Sample Size: 29 Subjects [1 patient lost to follow up]

Study Duration: 4 weeks

Study Setting:

RJS College Of Physiotherapy OPD

SJS Hospital Physiotherapy OPD

Study Material:

Video Analysis Software Kinovea.

Communicative Participation Item Bank



TREATMENT PROTOCOL

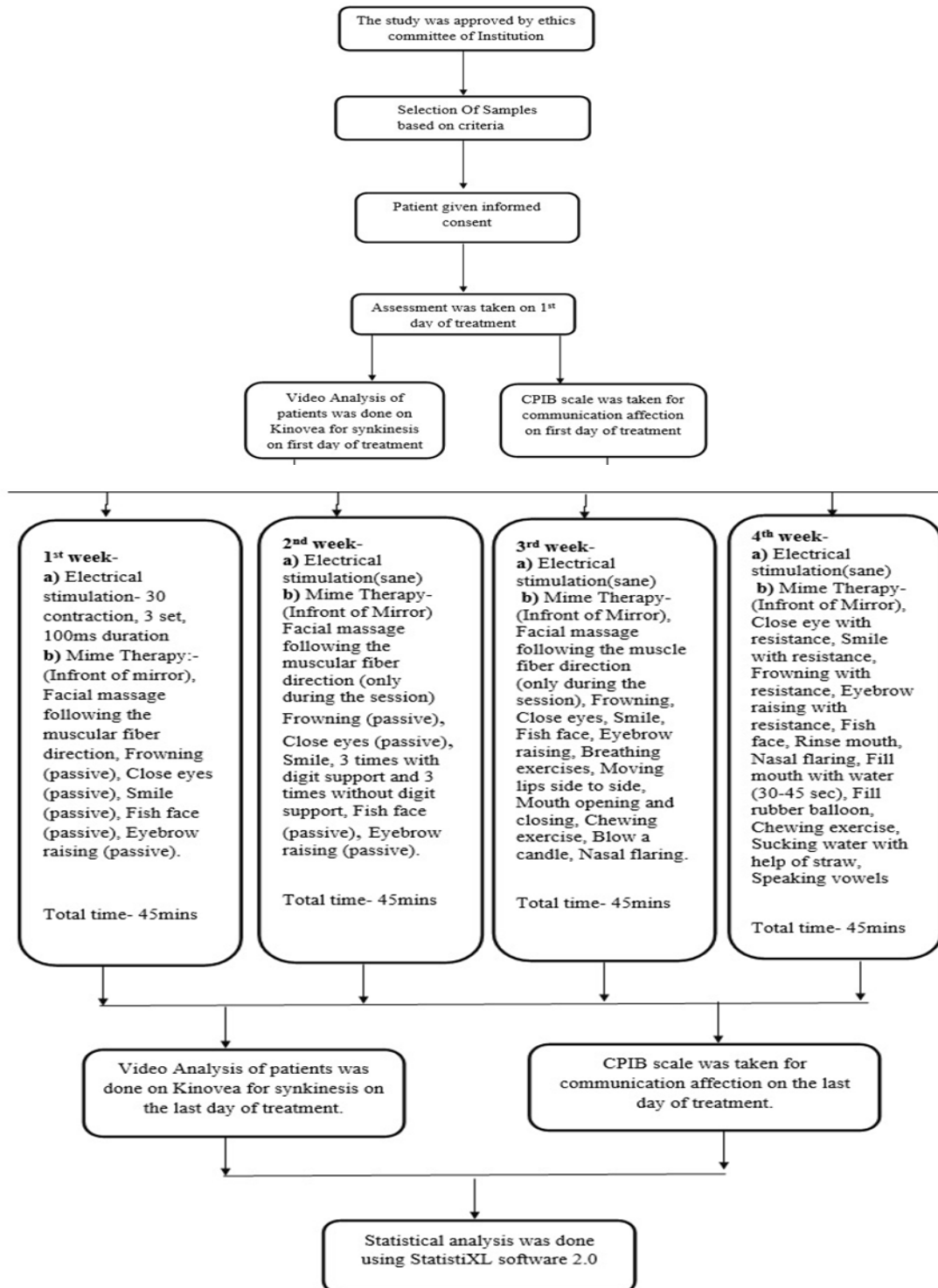


Fig 1: Flowchart Of Procedure



OUTCOME MEASURES:

1. Video Analysis Software Kinovea:

We utilized the free video analysis software Kinovea that can track preselected points during movements and measure two-point distances off-line. Three raters positioned facial markers on 29 healthy individuals and video-taped them during maximal bilateral contractions of frontalis, corrugator, orbicularis oculi, zygomaticus, orbicularis oris, and buccinator, according to pre and post results.



Fig 2: Muscles are marked and measured using video analysis software kinovea

2. Communicative Participation Item Bank:

The following questions describe a variety of situations in which you might need to speak to others. For each question, please mark how much your condition interferes with your participation in that situation. By “condition” we mean ALL issues that may affect how you communicate in these situations including speech conditions, any other health conditions, or features of the environment. If your speech varies, think about an AVERAGE day for your speech – not your best or your worst days.

	Not at all (3)	A little (2)	Quite a bit (1)	Very much (0)
1. Does your condition interfere with... ...talking with people you know?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Does your condition interfere with... ...communicating when you need to say something quickly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Does your condition interfere with... ...talking with people you do NOT know?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Does your condition interfere with... ...communicating when you are out in your community (e.g. errands, appointments)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Does your condition interfere with... ...asking questions in a conversation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Does your condition interfere with... ...communicating in a small group of people?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Does your condition interfere with... ...having a long conversation with someone you know about a book, movie, show or sports event?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Does your condition interfere with... ...giving someone DETAILED information?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Does your condition interfere with... ...getting your turn in a fast-moving conversation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Does your condition interfere with... ...trying to persuade a friend or family member to see a different point of view?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fig 3: communicative participation item bank

RESULT

For the synkinesis presentation in Bell’s Palsy patients we used the video analysis software kinovea as the outcome measure and we noted that there is significant difference in pre and post readings in some muscles [orbicularis oculi, corrugator] and small difference in other muscles [frontalis, orbicularis orris, zygomaticus and buccinator]

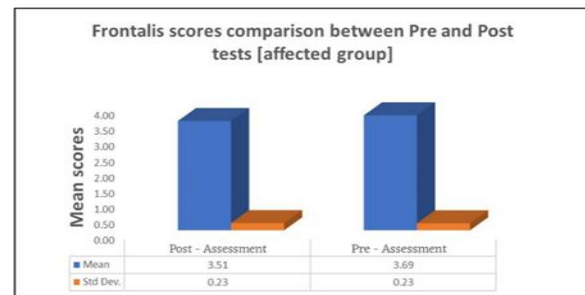


Fig 4: Frontalis muscle pre and post-tests for affected side

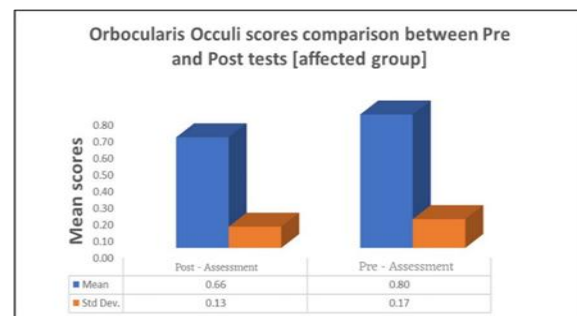


Fig 5: Orbicularis Oculi muscle pre and post-tests for affected side

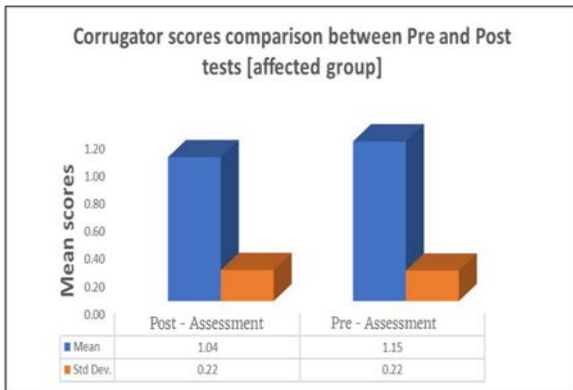


Fig 6: Corrugator muscle pre and post-tests for affected side

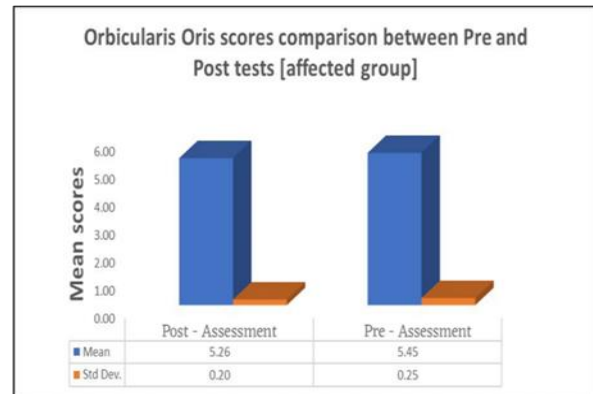


Fig 8: Orbicularis Orris muscle pre and post-tests for affected side

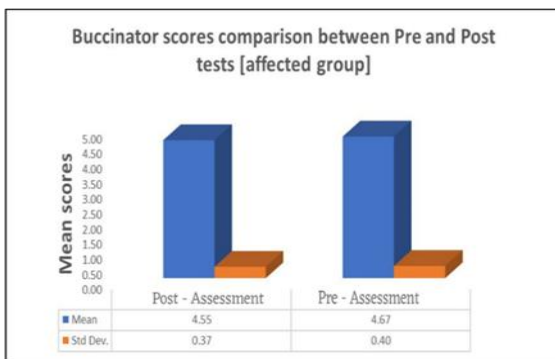


Fig 7: Buccinator muscle pre and post-tests for affected side

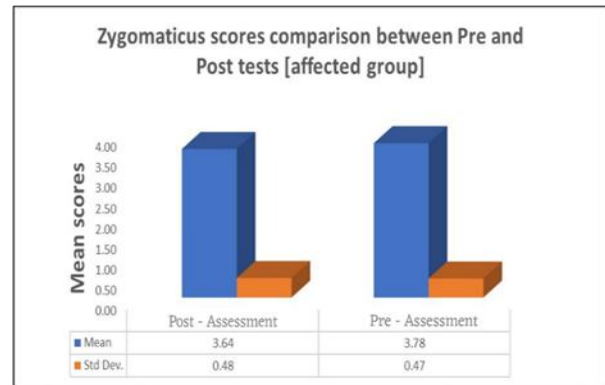


Fig 9: Zygomaticus muscle pre and post tests for affected side

For communication participation we used CPIB questionnaire bank before and after the treatment to the patients.

Descriptive Statistics

Variable	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
Post	26.00	1.22	0.23	25.534	26.466	29
Pre	16.72	3.59	0.67	15.357	18.091	29

According to the descriptive statistics we can assume that there is significant difference is seen in pre and post mean values of patients.

1-tailed t-Test (Post > Pre)					
Ho. Diff	Mean Diff.	SE Diff.	't' value	DF	'p' value
0.000	9.276	0.635	14.599	28	0.000
			significant		'p' < 0.01



From the above results the following inferences could be drawn.

't' value is 14.599 is significant [$p < 0.01$]

Post CPIB mean value is 26.0 which is greater than the pre CPIB mean value 16.72

The diagram of the CPIB analysis is presented below:

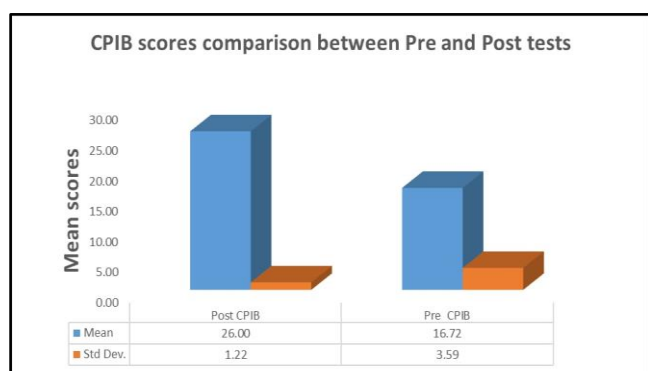


Fig 10: Comparison between CPIB scores of pre and post tests

One sample T test was used to find out the p value. As P value is less than 0.001 it shows extremely strong evidence against the null hypothesis which is there is no effectiveness of Mime therapy with electrical stimulation in facial synkinesis with communication affection in Bell's Palsy Patients. Hence from the statistics it is found that there is effectiveness of Mime therapy with electrical stimulation in facial synkinesis with communication affection in Bell's Palsy Patients. The difference in mean percentage of questionnaire is 9.276 which shows that there is some progress seen in the Bell's Palsy patients with facial synkinesis having communication affection.

DISCUSSION

Bell's palsy is a facial paralysis of acute onset presumed to be due to non-suppurative inflammation of unknown etiology of the facial nerve within its canal above the stylomastoid foramen. It occurs any time from infancy to old age. However, it is more seen among younger population and males are more affected than females. There is no sensory loss as the sensory branches arise from proximal part of the facial nerve whereas Bell's palsy involves the distal area of the nerve. The muscles that are paralyzed are frontalis, corrugator supercili, orbicularis oculi, nasalis, levator labi superioris and

inferiori, risorius, buccinator, depressor labi orbicularis oris and mentalis.^[1]

A similar study was conducted by Preksha Prajapati et al, 2019 has conducted a comparative study and the results of the study concludes that the treatment protocol compromised of effectiveness of electrical stimulation with mime therapy versus electrical stimulation with motor imagery technique in patients with Bell's Palsy.

A similar study was conducted by Tyler S. Okland et al, 2023 has conducted a study on patients with nonflaccid FP or synkinesis, is there a correlation between disease-specific quality-of-life and communicative ability or dysfunction and the results of the study concludes that the Synkinesis is associated with significant deficits in communicative ability.

There are several treatment protocols which are set to treat Bell's Palsy. Combination of these treatments seems effective in patients with Bell's Palsy as their goal is to regain facial symmetry, facial muscle strength, communication problems etc. Following are some treatment measures which we usually do are Electrical Stimulation for Facial Muscles, Neuromuscular retraining (NMR), Massage Therapy, Facial PNF Techniques, Mirror Therapy and Mime Therapy etc.

The conducted study aims was to see the effectiveness of Mime therapy with electrical stimulation for facial synkinesis with communication affection in Bell's Palsy patient. The study population selected was both males and females between the age of 40-60 years. The synkinesis in the subjects are calculated using video analysis software kinovea that can track preselected points during movements and measure two-point distances off-line. Three raters positioned facial markers on 29 healthy individuals and video-taped them during maximal bilateral contractions of frontalis, corrugator, orbicularis oculi, zygomaticus, orbicularis oris, and buccinator, according to pre and post results and the communication affection was calculated using the Communication Participation Item Bank [CPIB] scale. To score the short form, add the scores for the ten items to obtain a summary score (Not at all = 3; A little = 2; Quite a bit = 1; Very much = 0). The summary score will range from 0 – 30. High scores are more favourable, meaning that high scores indicate less interference in participation.



The statistical analytic data results denoted extremely strong evidence against the null hypothesis which is there is no effectiveness of Mime therapy with electrical stimulation in facial synkinesis with communication affection in Bell's Palsy Patients. Hence from the statistics it is found that there is effectiveness of Mime therapy with electrical stimulation in facial synkinesis with communication affection in Bell's Palsy Patients. The difference in mean percentage of questionnaire is 9.276 which shows that there is some progress seen in the Bell's Palsy patients with facial synkinesis having communication affection.

Mime therapy is beneficial because massage improves circulation and maintains muscle properties. Visual feedback has shown to manage muscle activities in facial muscle. Also miming demands extraordinarily refined sense of body and muscle control. mime therapy has shown to create new growth and increase production of collagen and connective tissue in facial muscles and restore facial muscle action. In group A, improvement in facial function could be because of Mime therapy and Electrical stimulation could be a combination of an active movement with simultaneous passive stimulation that helps in fast restoration of facial function. Mime therapy found to be effective by neuro physiological mechanism of production of extremely refined sense of muscle control. This treatment technique produces a complete and immediate recovery of facial function.

CONCLUSION

As we performed our study and the post CPIB mean value is greater than the pre CPIB mean value. There was significant change been seen in two muscles, orbicularis oculi, corrugator supercili. So, the results of the study we can conclude that there is significant effect of Mime therapy along with electrical stimulation for synkinesis with communication affection.

CONFLICT OF INTEREST

The authors have no conflict of interest to report.

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