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Effectiveness of Electrical Stimulation with Mime Therapy Versus Electrical Stimulation with Motor Imagery Technique in Patients with Bell's Palsy: A Comparative Study

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Abstract: ***Background: Bell's palsy is an acute-onset Peripheral facial pathology and is the commonest explanation for lower motor nerve fiber facial palsy. The physical therapy treatment for Bell's palsy includes Electrical stimulation of affected facial muscle and mime therapy. Aim: To seek out whether there is any significant difference between effectiveness of electrical stimulation with Mime therapy and electrical stimulation with motor imagery technique in patients with Bell's Palsy. Objective: To improve motor function and strength of facial muscles. Methodology: On the premise of inclusion and exclusion criteria 30 participants were elect. They were treated with Electrical stimulation with Mime therapy and electrical stimulation with motor imagery technique for 5 days / week for 6 weeks, subsequently that re-assessment was infatuated HBS, MMT and SD curve. Results: using SPSS Version 26.Parametric test was used. In Group A improvement was seen The data was analyzed. Conclusion: Electrical stimulation with mime therapy is effective to improve strength and motor function in patients with Bell's Palsy.***

Keywords: Bell's Palsy, Electrical Stimulation, Mime Therapy, Motor Imagery Technique, Facial Muscles

1. Introduction

Bell's palsy can be defined as unilateral paralysis of the facial muscles resulting from an intrinsic lesion of the facial nerve.[1] Bell's palsy is an acute-onset of Peripheral facial neuropathy and is the commonestreason for lower motor neuron facial palsy. [2] The term Bell's palsy was coined by sir Charles Bell in 1774-1842. [3]It affects males and females equally , and has a slightly higher incidence in middle and later life, but certainly occurs across all age ranges.[4]

The causes can be compression of facial nerve along the nerve course, herpes infection, exposure to cold air, middle ear infections, traumatic injuries or post surgeries of dental and ear, nose or throat.[6]

The common features are loss of forehead wrinkles and inability to close frown, Droopy eyebrow and inability to raise eyebrow, Inability to close the eye fully or blink, Watery eye (crocodile tears), Inability to squint, Painful eye with symptoms of grittiness or imitation, sensitivity to light, drooling from the weak corner of your mouth, excess or reduced salivation (dry mouth), Inability to flare nostril, Loss of taste in anterior 2/3rd of the tongue, Hyperacusis.[7]

The physiotherapy treatment for Bell's palsy includes Electrical stimulation of affected facial muscle and mime therapy.[8]

In Electrical stimulation, the stimulation is given to the paralyzed muscles that are dennervated and to the nerve trunks or branches till the voluntary movement returns.[9] The nerve impulses to the muscles are blocked due to the lesion in facial nerve, by giving electrical stimulation the external stimulus can produce electric impulses which helps in restoring the muscle properties. [9]

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.[10]The aim of mime therapy is to promote symmetry of the face at rest and through movement.[10] Components of Mime therapy include:-

1) Anamnesis, patient information about treatment and prognosis.
2) Self massage of face and neck.
3) Breathing and relaxation exercises.
4) Specific exercises to co-ordination both facial halves and to decrease synkinesis.
5) Eye and lip closure exercises.
6) Expression exercises.[10]

Motor imagery can be defined as a dynamic state during which an individual Mentally stimulates a physical action. This kind of extraordinary expertise implies that the subject feels themselves that performing the action.[11]Motor imagery can act as a substitute for the imagined behavior, producing similar effects on cognition and behavior.[12]

2. Methodology

Participants of male and female with the age was between 20 to 40 years of age, having Bell's palsy,Clinically diagnosed patients of Bell's palsy, and who were willing to be a part of the study were included in the study. These individuals were informed about the study and the procedure was clearly explained to all. An informed and written consent was obtained from the subjects those who agreed to be a part of the study that was to be conducted.The participants which were selected were then randomly assigned in to 2 groups A and B. Thirty subjects with mean age of 32.6 ± 6.25(mean ± SD) became a part of the study. The participants underwent a detailed pre-evaluation. The pre-evaluation included an Neurological assessment which obtained information about demographic details, medical history, personal history, functional scale, muscle strength and Motor function of the subjects.Subjects who fulfilled the selection criteria were informed about the study and requested to sign written informed consent forms.In this study SD curve, House-Brackmann facial paralysis scale and MMT of facial muscle were used as outcome measures. Experiments were conducted on 15 subjects in Group A, 15 subjects in Group B. Group A was treated with Electrical stimulation with Mime therapy and Group B was given Electrical stimulation with Motor imagery technique. The treatment protocol consisted of 5 sessions/week for 6 weeks.After 6 weeks of treatment the participants of both groups underwent post-evaluation and the pre and post- treatment data were noted.

3. Intervention

Group A: Electrical Stimulation With MIME Therapy

1st week:-
a) Electrical stimulation:- 30 contraction, 3 set, 100 duration
b) Mime Therapy:-(Infront of mirror)
- Facial massage following the muscular fiber direction. (only during the session)
- Frowning (passive)
- Close eyes (passive)
- Smile(passive)
- Fish face (passive)
- Eyebrow raising (passive)
- Breathing exercises

2nd week
a) Electrical stimulation
b) Mime Therapy:- (Infront of Mirror)
- Facial massage following the muscular fiber direction. (only during the session)
- Frowning (passive)
- Close eyes (passive)
- Smile, 3 times with digit support and 3 times without digit support.
- Fish face (passive)
- Eyebrow raising (passive)
- Breathing Exercises
- Blow your cheeks

3rd week :-
a) Electrical stimulation
b) Mime Therapy :- (Infront of Mirror)
- Facial massage following the muscular fiber direction (only during the session)
- Frowning
- Smile
- Close eyes without support
- Fish face
- Eyebrow raising
- Breathing exercises
- Blow your cheeks
- Mouth opening and closing

4th week :-
a) Electrical stimulation
b) Mime Therapy:- (Infront of Mirror)
- Facial massage following the muscle fiber direction (only during the session)
- Frowning
- Close eyes
- Smile
- Fish face
- Eyebrow raising
- Breathing exercises
- Moving lips side to side
- Mouth opening and closing
- Chewing exercise
- Blow a candle
- Nasal flaring

5th week :-
a) Electrical stimulation
b) Mime Therapy:- (Infront of Mirror)
- Close eyes with resistance
- Smile with resistance
- Frowning
- Eyebrow raising
- Fish face
- Moving lips side to side
- Nasal flaring
- Blow a candle
- Sucking air with help of straw
- Chewing exercise
- Breathing exercises
- Rinse mouth
- Speaking vowels

6th week:-
a) Electrical stimulation
b) Mime Therapy :- (Infront of Mirror)
- Close eye with resistance
- Smile with resistance
- Frowning with resistance

- Eyebrow raising with resistance
- Fish face
- Rinse mouth
- Nasal flaring
- Fill mouth with water (30-45 sec)
- Fill rubber balloon
- Chewing exercise
- Sucking water with help of straw
- Speaking vowels
- Breathing exercises

Group B: Electrical Stimulation With Motor Imagery Technique

Week:- 1st+

a) Electrical stimulation :- 30 contraction, 3 set, 100 duration
b) Motor imagery technique:- (perform in a silent room)

- First ask the patient to sleep on the plinth and close the eyes.
- Then ask the patient to relax the all parts of the body.
- Then ask the patient to take a deep breath and exhale slowly.
- Then ask the patient to imagine that "you are raising your eyebrows", "you are showing your angary face", "you are closing and open your eyes", "you are smiling", "you are pouting".

Week:- 2nd

a) Electrical stimulation
b) Motor imagery technique:- (perform in a silent room)

- First ask the patient to sleep on the plinth and close the eyes.
- Then ask the patient to relax the all parts of the body.
- Then ask the patient to take a deep breath and exhale slowly.
- Then ask the patient to imagine that "you are showing your angary face", "you are closing and open your eyes", "you are smiling", "you are pouting", "you are raising your eyebrows", "you are blowing your cheeks".

Week:- 3rd

a) Electrical stimulation
b) Motor imagery technique:- (perform in a silent room)

- First ask the patient to sleep on the plinth and close the eyes.
- Then ask the patient to relax the all parts of the body.
- Then ask the patient to take a deep breath and exhale slowly.
- Then ask the patient to imagine that "you are showing your angary face", "you are closing and open your eyes", "you are smiling", "you are pouting", "you are raising your eyebrows", "you are blowing your cheeks", "you are opening and closing your mouth".

Week:-4th

a) Electrical stimulation
b) Motor imagery technique:- (perform in a silent room)

- First ask the patient to sleep on the plinth and close the eyes.
- Then ask the patient to relax the all parts of the body.
- Then ask the patient to take a deep breath and exhale slowly.
- Then ask the patient to imagine that "you are showing your angary face", "you are closing and open your eyes", "you are smiling", "you are pouting", "you are raising your eyebrows", "you are blowing your cheeks", "you are opening and closing your mouth". "you are doing nasal flaring", "you are blowing the candle", "you are deviating your lips side to side", "you are chewing something".

Week:- 5th and 6th

a) Electrical stimulation
b) Motor imagery technique:- (perform in a silent room)

- First ask the patient to sleep on the plinth and close the eyes.
- Then ask the patient to relax the all parts of the body.
- Then ask the patient to take a deep breath and exhale slowly.
- Then ask the patient to imagine that "you are raising your eyebrows", "you are showing your angary face", "you are closing and open your eyes", "you are doing nasal flaring", "you are blowing air from your mouth", "you are drinking water with the help of straw", "you are blowing the candle", "you are smiling", "you are deviating your lips side to side", "you are pouting", "you are chewing something", "you are speaking vowels".

- I will give 15-20 seconds in between each instruction, to the patients to imagine the movement.


Electrical stimulation for facial muscles


Mime therapy Infront of Mirror

Motor Imagery Technique

4. Result

Pre and post-treatment data of the participants of both groups were noted. All statistical analysis was done using SPSS 26 software for windows. Descriptive analysis was obtained by using mean & standard deviation. The intergroup comparison between Group A and B of pre-treatment and post-treatment of House-Brackmann scale was done by paired t-test and Manual Muscle Testing was done byWilcoxson sign ranked test.The intragroup comparison of pre-treatment and post-treatment of House-Brackmann scale within Group A and Group B was done by unpaired t-test and Manual Muscle Testing within Group A and Group B was done by Mann-Whitney U test.

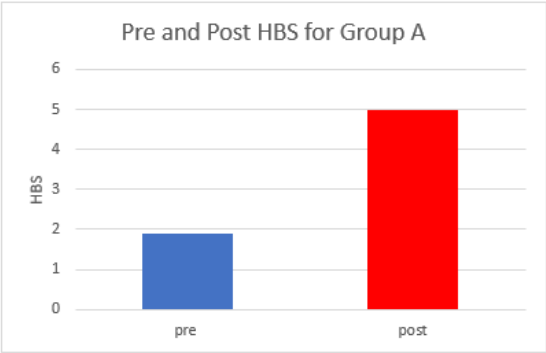
Table 1: Pre and Post treatment values of Group A

Group A	*Pre-Treatment Mean ± SD*	*Post-Treatment Mean ± SD*
HBS	1.9 ± 0.79	5 ± 0.5
MMT	1.5 ± 0.0	1.92 ± 0.19

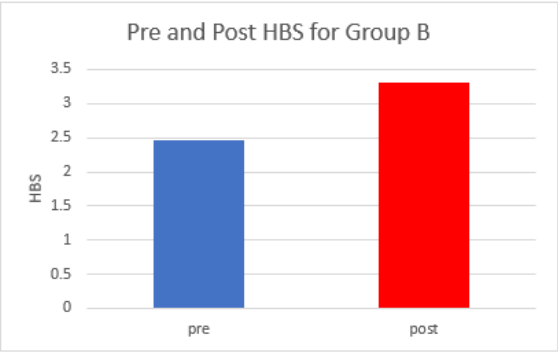
Table 2: Pre and Post Treatment values of Group B

Group B	*Pre-Treatment Mean ± SD*	*Post-Treatment Mean ± SD*
HBS	2.46 ± 0.79	3.3 ± 0.74
MMT	1.5 ±0.0	1.58 ± 0.054

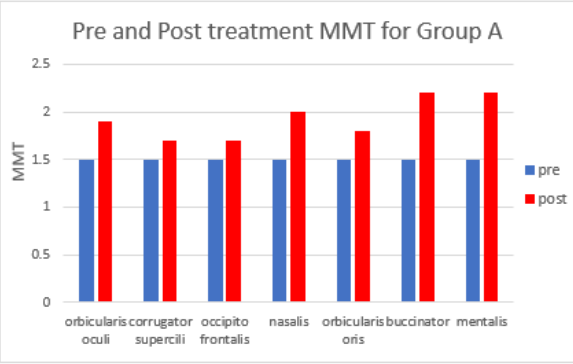
Graph for HBS for Group A



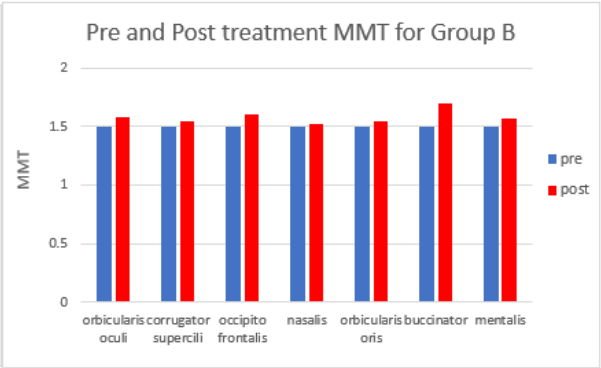
Graph for HBS for Group B

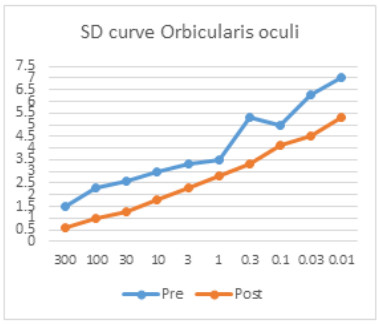


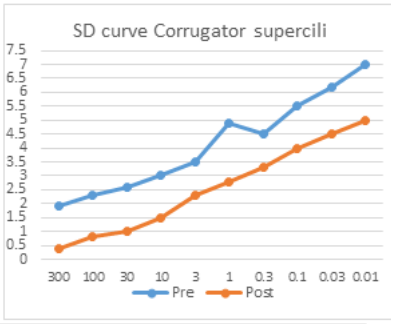
Graph for MMT for Group A

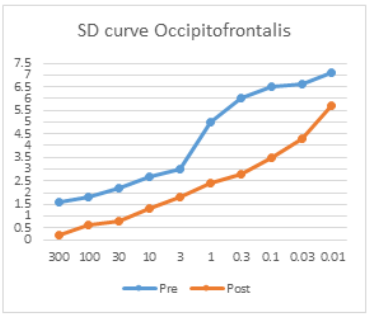


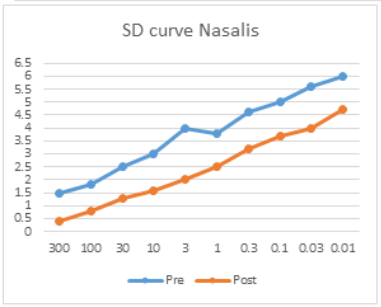
Graph for MMT for Group B

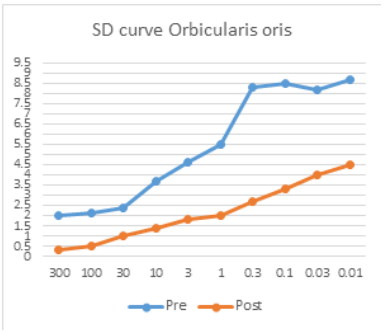


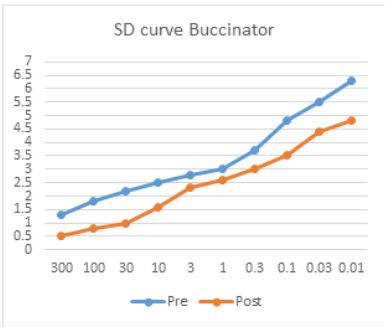


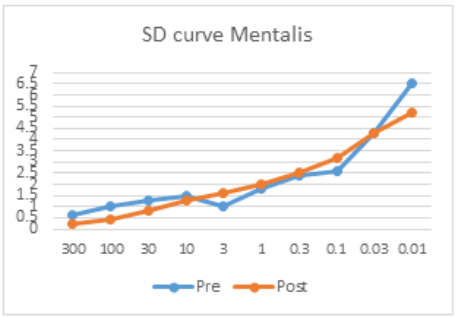












Similar graphs of SD curve were found in other subjects that were a part of the study.

The results found in this study disclosed that after a six-week treatment program, both groups, Group A, who received Electrical stimulation with Mime therapy and Group B who received Electrical stimulation with Motor imagery technique attained a significant improvement in the strength and motor function of facial muscles. But statistically greater significant improvement was seen in Group A as compared to Group B (p value < 0.05).

5. Discussion

The results found throughout this study disclosed that when a six-week treatment program, eachgroup, Group A, who received Electrical stimulation with Mime therapy and Group B who received Electrical stimulation with Motor imagery technique attained a significant improvement in the strength and Motor function of Facial muscles.

Electrical Stimulation is one of the most important components of rehabilitation programmes for patients with Bell's palsy.

Sharvani Belle Praveen Kumar (2018) declared that 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.

Teresa Paolucci (2019) declared that Motor imagery technique is effective in improving facial physical function and that they contained psycho-emotional distress and improved quality of life that is also linked to emotional and communicative aspects of mimic expressions. It's necessary to emphasis however, particularlywithin the early stages of the treatment and through the primary rehabilitative amount, to avoid synkinesis, the exercise respect to the myofascial facial maneuvers is performed passively, and the patient is not required to recruit any muscles.

Lotzs and Cohen (2006) declared that Motor imagery is a cognitive process in which a subject imagines that he=she performs a movement without actually performing the movement and while not even tensing the muscles. It is a dynamic state throughout that the illustration of a particular motor action is internally activated with none motor output. In other words, motor imagery needs the aware activation of brain regions that also are concerned in movement preparation and execution, accompanied by a voluntary inhibition of the particular movement.

This study was conducted on thirty subjects with mean age of 32.6 ± 6.25 mean ± SD). The subjects were divided into two groups; Group A received Electrical stimulation with Mime therapy and Group B received Electrical stimulation with motor imagery technique for 1 session/day and 5 days/week for 6 weeks. during this study SD curve, House-Brackmann facial paralysis scale and MMT of facial muscle were used as outcome measures. The results showed a significant improvement in the outcome measures in post-treatment stage as compared to the pre-treatment stage.

A significant improvement was found after treatment in Group A in case of HBS Score as compared to Group B. A significant improvement was found after treatment in Group A in case of MMT compared to Group B.

6. Conclusion

In the experimental conditions used in the study, both the groups showed significant improvement in Strength and Motor function of facial muscles. The use of Electrical stimulation with Mime therapy (Group A) evidenced a significantly greater improvement in Strength and Motor function of facial muscles when compared to Electrical stimulation with motor imagery technique (Group B).

7. Limitations

1) Long term follows up of the patients was not taken.
2) The study includes treatment period of 6 weeks only.
3) The study involves small sample size.

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