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EFFECT OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ALONG WITH MIME THERAPY AND ELECTRICAL STIMULATION ON FACIAL ASYMMETRY AND DISABILITY IN SUBJECTS WITH BELL'S PALSY: A RANDOMIZED CONTROL TRIAL

Physiotherapy

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ABSTRACT

Bell's palsy is a common condition characterized by sudden, unilateral facial paralysis, often caused by idiopathic. It affects both genders equally, although higher incidence rates have been observed in pregnant women, individuals with diabetes, and those with a family history of the condition. While the majority of subjects recover within 3 to 6 months, up to 30% may experience residual symptoms, including facial weakness or synkinesis. It typically results in facial asymmetry, loss of facial expression, and potential complications such as facial dysfunction, affecting daily life and social interactions.30 Subjects were randomly divided into 2 groups and both groups received electrical stimulation commonly. Experimental group received PNF, MIME therapy & Control group received MIME therapy assessed with FDI and SBFGS before and after interventions for 4 weeks. Pretreatment FDI physical function were 49.87 ± 14.793, social well-being 74.07 ± 12.244 & SBFGS were 73.14 ± 8.823 respectively post treatment scores were - physical function 91.40 ±4.388, social well-being 94.67 ± 5.57 & SBFGS were 93.80± 4.724 respectively. It's significant difference p< 0.001. This study concludes that combination of PNF techniques along with MIME therapy & electrical stimulations showed improvement in facial asymmetry and reduced disability in subjects with bell's palsy.

KEYWORDS

Bell's palsy, PNF, MIME therapy, SBFGS

INTRODUCTION

Bell's palsy is a condition that causes sudden, temporary facial weakness or paralysis, usually on one side of the face. It happens when the facial nerve, which controls the muscles responsible for facial movements, becomes inflamed. Although the exact cause is not always known, it is believed that viral infections, particularly the herpes simplex virus (the virus that causes cold sores), can lead to this inflammation. People with Bell's palsy may find it difficult to close one eye, smile, or raise their eyebrow on the affected side. In addition to facial weakness, some may experience pain or discomfort around the jaw and ear, and a loss of taste on the front part of the tongue.

The annual incidence of Bell's palsy varies around the world with an estimated incidence of around 20 -30 per 100,000 people.[1]

Most notably, viral infections seem to play a significant role. The herpes simplex virus is the most commonly implicated, though other viruses such as varicella zoster (which causes chickenpox and shingles) and Epstein-Barr (which causes mononucleosis) can also contribute[2].

Bell's palsy can significantly affect a person's quality of life. The most obvious limitation is the facial weakness, which can make it difficult to smile, speak clearly, or eat without spilling. The inability to close the eye on the affected side can lead to dryness, irritation, and in some cases, more severe damage to the cornea. People may also lose the sense of taste on the front part of the tongue.[3]

Physiotherapy is an essential part of the rehabilitation process for people with Bell's palsy. The main goal is to help restore facial muscle strength, reduce asymmetry, and prevent complications like muscle contractures (tightening of muscles). One of the most common approaches is facial exercises. These exercises aim to improve the strength and coordination of the muscles in the face by encouraging movements such as raising the eyebrows, closing the eyes, and smiling.[4]

Need Of The Study

A systematic review of the literature on PNF's efficacy in treating facial paralysis dysfunction came to the conclusion that there was insufficient data to draw firm conclusions about the usefulness of PNF due to the small sample sizes of the majority of the included studies, the lack of comprehensive descriptions of the intervention protocols, and the limited number of studies that were eligible for inclusion.[6]

Many studies have been done on comparing the effectiveness of different interventions such as Electrical stimulations, Motor imagery techniques, Neuro-muscular re-education techniques, sensory exercises and MIME therapy on the facial dysfunction in bell's palsy subjects.[7]

Recent studies show that better results are obtained when MIME therapy is used either alone or in combination with PNF methods. Both therapies are therefore of great choices for those with Bell's palsy. The current study focuses on examining the effects of PNF and MIME therapy on facial dysfunction, as there are very few studies that compare their efficacy and the goal is to determine which treatment is much preferable.[10]

Aim Of The Study

The present study aimed to know the effect of PNF techniques along with MIME therapy and electrical Stimulation on facial asymmetry and disability in subjects with Bell's palsy.

Objectives Of The Study

To evaluate the effect of PNF along with MIME therapy and Electrical stimulation on facial disability in subjects with Bell's palsy by using facial disability index {FDI} in Experimental group.

To evaluate the effect of MIME therapy and Electrical stimulation on facial disability in subjects with Bell's palsy by using Facial disability index {FDI} in control group.

To evaluate the effect of PNF along with MIME therapy and Electrical stimulation on facial asymmetry in subjects with Bell's palsy by using SUNNY BROOK FACIAL GRADING SCALE{SBFGS} in Experimental group.

To evaluate the effect of MIME therapy and Electrical stimulation on facial asymmetry in subjects with Bell's palsy by using SUNNY BROOK FACIAL GRADING SCALE{SBFGS} in Control group.

To compare the effect of PNF along with MIME therapy and Electrical stimulation Vs MIME therapy and Electrical stimulation on facial asymmetry & disability in subjects with Bell's palsy by using sunny brook facial grading scale {SBFGS} and facial disability index {FDI}.

MATERIALS & METHODS:

METHODS

Study Design: A randomized control trail

Study Setting: Subjects with bell's palsy from College of Physiotherapy, General ward, Neurology ward, SVIMS, Tirupathi. Sri Venkateswara Ayurvedic, College, Tirupati.

Sample Size : 30 sample size

Samling Method: Lottery method
Study Duration: 6 months
Intervention Duration: 4-week duration, 6 days a week, 6 sessions., One hour per day.
Ethical Approval: Ethical approval received from the institution Ethical Committee, SVIMS, Tirupati. (Roc.No.AS/11/IEC/SVIMS/2017). No.1752.

Criteria For The Study
Inclusion Criteria
- Subjects with the age of 25 to 45 years , male and female with bell's palsy.
- Subject with Bell's palsy grade 2 and grade 3, according to house-Brackman facial grading system.
- Subject with unilateral bell's palsy either right or left side because of viral infections, cold sores, idiopathic.

Exclusion Criteria
- Subjects with open wounds or ulcers on face , Hyper sensitive skin or allergic skin, CNS disorders like MND, GBS, TUMORS , Post operative and post traumatic conditions, UMN facial palsy, Trigeminal neuralgia, sensory impairment over face, Ramsay hunt Syndrome , metal implants , ear otitis media or any other ENT impairments.

Materials
Electrical stimulator, Chair, Table, Couch., Mirror, Pillow, drape sheet.

Methodology
Study Procedure
Subjects were then allotted into Experimental group and Control group, with 15 subjects in each group by convenient sampling. Pre -test evaluations for both the groups are done using the outcome measures – Sunnybrook facial grading system, Facial Disability Index. Then, after the intervention, the post-test evaluations were done by the same outcome measures.
Experimental group: PNF +MIME therapy+ Electrical stimulations. (6 sessions a week, 4 weeks, one hour per day.)
Control group: MIME therapy + Electrical stimulations. (6 sessions a week, 4 weeks, one hour per day.)

Treatment Protocal :
- PNF Techniques:(5 repetitions, 2 sets /day)
- Position of the subject: In sitting position.
- Position of therapist: Therapist stands behind the subject.
- Frontalis: The subjects were instructed to raise their eye brows, while applying the resistance by the therapist, the therapist check the vertical displacement of the paralyzed side, and compared with unaffected side.
- Corrugator Supercilii: The subjects were instructed to frown the eyebrows, while applying the resistance by the therapist, just above the eyebrows diagonally in a cranial and lateral direction. This motion works with eye closing.
- Orbicularis oculi: The subjects were instructed to keep the eyes closed for 1 to 2seconds or even longer seconds(5-10) if possible, while applying the resistance by the therapist, for the upper and lower eye lid while doing upper eye lid and lower eye lid exercises respectively and therapist should avoid pressure on the eyeballs while applying resistance .
- Mentalis: The subjects were instructed to wrinkle the chin,-by the therapist apply the resistance to down and out of the chin.
- Zygomaticus and Risorius(open-mouth smile) :The subjects were instructed to smile, while applying the resistance by the therapist, to the corner of the mouth on the stronger side in the downward and medial direction.
- Levator labii alaeque nasi (snarl): The subjects were instructed to lift your upper lip ,while applying the resistance by the therapist, to the upper lip in the downward and medial direction and ask the subject to show your upper teeth.
- Orbicularis Oris: The subjects were instructed to purse the lips and whistle, while applying the resistance by the therapist, to the upper lips in the lateral and upward direction and to the lower lip in the lateral and downward direction.

Mime Therapy:
Treatment Protocol:(5 repetitions, 2 sets /day)
- Position of the therapist: Therapist stands behind the subject.
- Position of the subject: In sitting position, Infront of the mirror.
- Instruct the subject: The therapist instructed to the subject to encourage the all expression and exercises of MIME Therapy. Components of Mime therapy include:-
- Facial massage following the muscular fiber direction. Frowning Eye brows, Closing eyes ,Fish face, Rising Eyebrows, Breathing exercise ,Blow your cheeks, Mouth lips side to side ,Chewing exercise , Blow a candle, Nasal flaring ,Sucking air with help of straw, Rinse mouth ,Speaking vowels ,Smile with resistance.

Electrical Stimulations: 30 Contractions , 2 Sets /day
Galvanic Current
- Galvanic current was used at frequency of 30Hz with the pulse duration was set at 100 milliseconds with the inter-pulse interval of 0.3 milliseconds
- While the intensity was kept at a level where a minimal visible contraction was obtained.
- For individual muscle: Frontalis, Corrugator, Temporalis, Nasalis, Zygomaticus major& minor, Orbicularis oris, Risorius, Buccinator and Mentalis.

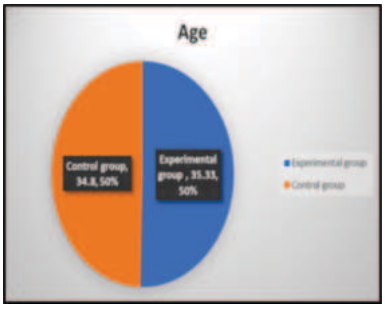
Faradic Current
- Faradic current was used at 50Hz frequency with a pulse duration of 0.7 milliseconds.

Stimulation for the nerve trunk was given in 3 consecutive sets, with each set consisting of 30 contractions.

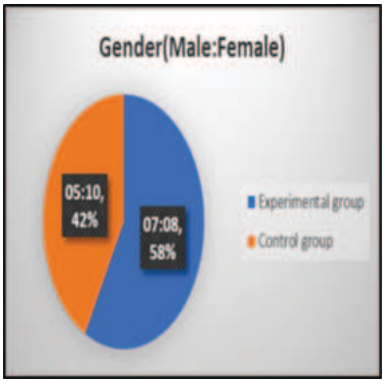
Statistical Analysis
Statistical analysis was done using software SPSS 26 version. For this purpose, the data was entered into Microsoft excel spreadsheet, tabulate to statistical analysis of the 30 subjects. A paired t-test was used to compare pre- and post-treatment effects within groups, as the data followed a normal distribution. Additionally, an independent sample t-test was used to compare the treatment effects between groups. $P < 0.05$ is considered as significant.

RESULTS
Demographic Variables –
Table 1: Baseline Characteristics Of Study Population (experimental And Control Groups) :

Variables	Experimental group (n=15)	Control group(n=15)	P –Value (2-Tailed)
Age (years)	35.33± 6.433	34.80 ± 7.608	P=0.76
Gender (M:F)	7: 8	5: 10	X^2 =0.556 P=0.456
Side (Right:Left)	7:8	8:7	X^2=0.21 P=0.301



Graph 1: The Graphical Representation Of Age Distribution



Graph 2: The Graphical Representations Of Gender Distribution

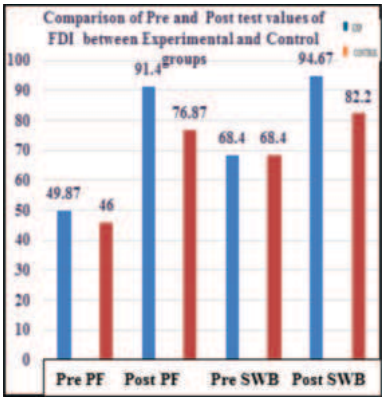
Table 2: Comparison Of Between The Groups Of Fdi (Physical Function & Social Well-being)

Physical Function

Parameters	Test	N	Mean ± SD	T value	P value
FDI (PF)	PF (Exp pre)	15	49.87 ±14.793	0.702	0.49
	PF(Control pre)	15	46 ±15.376		
	PF(Exp post)	15	91.40 ±4.388	8.54	0.00
	PF(Control post)	15	76.87 ± 4.926		

Social Well_being

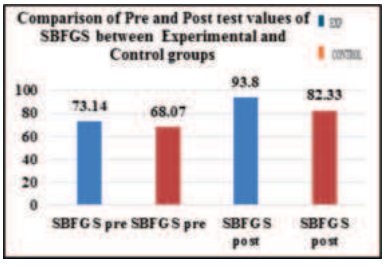
Parameters	Test	N	Mean ± SD	T value	P value
FDI (SWB)	SWB (Exp pre)	15	74. 07 ±12.24	1.43	0.64
	SWB (Control pre)	15	68.40 ±9.195		
	SWB (Exp Post)	15	94.6 ± 5.56	6.82	0.001
	SWB (Control post)	15	82.20 ±4.296		



Graph 3: Graphical Presentation Of ComparisonOf Between Groups Of FDI (physical Function & Social Well-being)

Table 3: Comparison Of Between The Groups Of SBFGS

	Test	N	Mean ± SD	T- Value	p-Value
SBFGS	Exp (Pre)	15	73.14 ± 8.823	1.88	0.071
	Control (Pre)	15	68.07 ± 5.522		
	Exp (Post)	15	93.80 ± 4.723	8.18	0.00
	Control (Post)	15	82.33 ± 2.690		



Graph 4: Graphical Presentation Comparison Of Between Groups Of SBFGS

DISCUSSION

An earlier study by Baber et al. on the validity of an early rehabilitation approach for Bell's palsy subjects concluded that PNF rehabilitation, when applied at an early stage produced a more rapid recovery compared with non-rehabilitated subjects. The better prognosis in the PNF in two subcomponents of SBFGS and FDI, resting symmetry and disability, and in the physical function and social function subscales in this method, the proprioceptors such as muscles, tendon spindles, ligaments are stimulated by the resistance of movement, which facilitates muscle contraction.The facial muscles act on each other, because the facial muscle is a thin skin muscle that acts from bone to skin or skin to skin. PNF could affect the skin muscles that are distributed over the entire surface of the human face, which could contribute to early improvement. The only drawback is that continuous training might be required to strengthen the muscle in the long term. PNF patterns produces appropriately strong muscle contractions by using diagonal stretching patterns, these repetitive movements are according to the principle of irradiation and the additional bilateral co-contraction initiate an early recovery. Therefore, it is more effective in improving facial symmetry and reducing facial disability in patients with Bell's palsy [8].

Sharvani Belle Praveen Kumar (2018) found in their study that Mime therapy is beneficial because massage improves circulation and maintains muscle properties. Visual feedback has shown to manage muscle activities in facial muscles. 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 this study, subjects with Bell's palsy were assessed with SBFGS and FDI Questionnaire to measure facial asymmetry and disability. There are Several studies have reported promising effects of PNF, MIME therapy with conventional physiotherapy, but there have been few studies investigating the effect of Mime therapy protocol on improvement in subjects with Bell's palsy.[9]

In the acute phase, the use of electrotherapy is believed to accelerate nerve regeneration and reduce inflammation by promoting better blood flow and reducing muscle disuse atrophy. In chronic Bell's Palsy, electrotherapy may not restore nerve function but can help improve muscle tone and facial expression, contributing to aesthetic and functional recovery. [10]

CONCLUSION

This study was conducted on 30 Bell's palsy subjects.15 subjects of Experimental group were trained with PNF, MIME Therapy, and Electrical stimulations that for 4 weeks, and 15 subjects of control group were trained with MIME therapy and Electrical stimulations for 4 weeks. The finding of this study concluded that PNF, MIME therapy along with Electrical stimulations was found to be effective, when compared to MIME therapy with Electrical stimulations in Bell's palsy subjects.

LIMITATIONS

- Sample size was small
- Short term follows up
- The study was done with HBS grade 2& 3 but not on above and below.

Future Recommendations

- Larger sample sizes
- Comparative research involving other advanced therapeutic modalities such as biofeedback or virtual reality assisted exercises can help treatment protocol.
- Long term efficacy and sustainability of the combined treatment approach.

REFERENCES

1. Akolkar R, Patil C. Effectiveness of Proprioceptive Neuromuscular Facilitation V/S Massage in Patients with Bell's Palsy. J Coast Life Med. 2023 Feb 22;11:564-72.
2. Byl FM, Hilsinger RL, Adour KK. A Review of Facial Nerve Anatomy. Semin Plast Surg. 2004 Feb;18(1):5–11.
3. Spencer CR, Irving RM. Causes and management of facial nerve palsy. Br J Hosp Med (Lond). 2016 Dec 2;77(12):686-91.
4. Prajapati P, Patel S. Effectiveness of Electrical Stimulation with Mime Therapy Versus Electrical Stimulation with Motor Imagery Technique in Patients with Bell's Palsy: A Comparative Study. Med. 2022;3(4):505-6
5. Silva MC, Oliveira MT, Azevedo-Santos IF, DeSantana JM. Effect of proprioceptive neuromuscular facilitation in the treatment of dysfunctions in facial paralysis: a systematic literature review. Braz J Phys Ther. 2022 Nov-Dec;26(6):154.
6. Parveen U, Maurya N, Khan AR, Khan A, Aafreen A, Shohaim S, Ahamad T. Effectiveness of Neuromuscular Electrical Stimulation and Proprioceptive Neuromuscular Facilitation in Combination With Facial Exercise in Patients With Bell's Palsy: A Comparative Study.2015;26:183-6.
7. Seok JI, Lee DK, Kim KJ. The usefulness of clinical findings in localizing lesions in Bell's palsy: comparison with MRI. J Neurol Neurosurg Psychiatry. 2008;79(4):418-20.
8. Grogan PM, Gronseth GS. Practice parameter: steroids, acyclovir, and surgery for Bell's palsy (an evidence-based review): report of the quality standards subcommittee of the American Academy of Neurology. Neurology. 2001;56(7):830-6.
9. Oliveira C, De Sousa R, Ramos C, Cruz AL. Effect of Electrostimulation Applied on Bell's Palsy—A Systematic Review. Open Access Library J. 2022 May 30;9(6):1-4
10. Peitersen E. Bell's palsy: the spontaneous course of 2,500 peripheral facial nerve palsies of different etiologies. Acta Otolaryngology. 2020:4-30.