



A Study to Find the Effectiveness of Neural Tissue Mobilization Alongwith Conventional Physiotherapy Treatment on Patients with Bell's Palsy on Functional Disability- A Pilot Study

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ABSTRACT

Background: Bell's palsy is characterized by an acute facial paralysis associated with inflammation and swelling of the 7th cranial nerve in the neural canal or else stylomastoid muscle leading to unilateral weakness of facial muscles, dropping of eyelid, continuous tearing from the eyes and pain. The rate of its occurrence is fifteen to twenty per 100,000 individuals. Various newer physiotherapy techniques have been developed recently that include multiwave locked system laser treatment, matrix rhythm therapy, mirror book therapy and others. Neural Mobilization is one of the newer techniques that has been practiced for Bell's Palsy. Neural mobilization of facial nerve was initially given by Faizan Kashoo in 2019. It has been demonstrated to enhance recovery in individuals with bell's palsy. Method: Ten patients (both male and female) with unilateral bell's palsy between the ages of 18-70 and House-Brackmann scores III-IV had been in the inclusion criteria of research study. The treatment regimen included neural mobilization of the facial nerve in addition to conventional physiotherapy techniques such as electrical stimulation, exercise of the face to be performed in front of mirror, and facial massage. The neural mobilization consisted of 25 repetitions, performed in 3-4 sets with a 5-second rest between sets, and was administered for a period of 3 weeks. Outcomes were measured by the use of Sunnybrook Facial Grading Scale and Facial Disability Index, both taken before and after 3 weeks of treatment. Result: The data was analyzed using the SPSS version 22. The analysis for FDI (p-value:0.005) was done using Wilcoxon signed rank test and that of Sunnybrook Facial Grading (p-value:0.00) as done using paired t-test. The results indicate a significant improvement from pre-treatment to post-treatment. Conclusion: The study found that the combination of neural mobilization and conventional physiotherapy is effective in enhancing function of patients having bell's palsy. It enhances the recovery in patients. Hence neural mobilization can be used as an adjunct for improving the function.

Keywords: Neural mobilization, Sunnybrook facial grading scale, Facial Disability Index

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INTRODUCTION

Bell's palsy is a condition defined as having sudden, acute paralysis of face due to inflammation or swelling of the 7th cranial nerve or stylomastoid muscle.[1] The name of it comes from Sir Charles Bell who was one of Scottish anatomists, it typically affects only one side of the face but can sometimes be bilateral and recur.[2] It may be associated with a family history and is believed to be linked to viral infections. Fifteen to twenty individuals from 1,00,000 can be considered as incidence. [3,4] Symptoms include muscle weakness, drooping eyelids, increased sensitivity to sound, ear pain, changes in taste, and other complications such as excessive tearing, difficulty eating and drinking, and difficulties with facial expressions. These can lead to social isolation and affect both function and quality of life. While around 70% of patients fully recover, 30% experience persistent effects.[5]

Diagnosing Bell's palsy typically begins with the history of medical illness and examining the physical functioning. Further most step in diagnosis has been rule out whether the weakness of the face is originated centrally or peripherally. In bell's palsy, which has been caused by a lesion of the Lower Motor Neuron (LMN), ipsilateral side of the facial muscles are affected. Clinically, various instruments are available to help document the degree of Bell's palsy. Modified House-Brackman Scoring, Sunnybrook Face Grading Scale, Yanagihara Grading System, Sydney Grading Scale can be used. Electromyograms, electroneurograms, and motor nerve conduction velocities are also available. Several diagnostic tools can be used to aid in the diagnosis and prognosis of this condition, including the Sunnybrook Facial Grading Scale also the Facial Disability Index. FGS is an evaluation tool that assesses face symmetry during rest, voluntary movements of the face, and synkinesis, with total scores ranging

from zero indicating completely paralysed to hundred referring to normal functioning.[7] Facial Disability Index is subjective scale that assesses 10 elements of social and physical functioning. It is a 10-item measure that assesses both physical and social function. The reliability and validity of this instrument was established by Van Swearingen JM in 1996. [8]

A lot of treatment modalities are available Medically, Surgically and Rehabilitative. Medical management includes steroidal agents such as prednisolone and antiviral drugs. In some cases, surgeries such as Transmetoid or Suboptimal decompression can be done.⁹Physiotherapy interventions such as electrotherapy, massage, exercise therapy and heat therapy have been shown to speed up the recovery, improve facial muscle function and reduce the complications. Physiotherapy techniques aimed at muscle retraining help in preventing the formation of muscle contractures and prevent facial muscle atrophy.[9] Various newer physiotherapy techniques have been developed recently that include multiwave locked system laser treatment, matrix rhythm therapy, mirror book therapy and others. Neural mobilization is a newer technique that has been used to treat Bell's Palsy. The technique was first introduced by Faizan Kashoo in 2019.[10] It has been shown to be effectively bringing recovery of patients suffering bell's palsy. Aim of this research had been investigating the effectiveness of neural mobilization on reducing functional disability in bell's palsy individuals, serving as a pilot study for a larger randomised control trials, comparing it with other therapies such as matrix rhythm therapy.

MATERIAL AND METHODS

STUDY DESIGN: A Pilot Study

SAMPLING TECHNIQUE: Convenient Sampling

SAMPLE SIZE: Total 10 patients

STUDY DURATION: 3 weeks.

SELECTION CRITERIA:

The subjects between 18 to 70 years were included. Both male and females were taken having the House-Brackmann Score of III-IV. The patients having Recurrent Bell's Palsy, Facial Palsy, History of stroke and undergone a recent surgery of ear had been excluded from the study.

Method:

The study was granted ethical approval by the Ethical Committee of Marwadi University. A sample of 10 patients (7 males and 3 females) were recruited for this research, which had been carried at Neuro OPD of C.U. Shah Physical Therapy Department in Surendranagar, after obtaining departmental approval for the research. The treatment regimen included both neural mobilization and conventional physiotherapy for a period of 3 weeks. The outcomes were measured using the Sunnybrook facial grading scale and Facial Disability Index.

Protocol

The neural mobilization technique used in this study was based on the method developed by Faizan Kashoo. In this procedure the lower part of the ear was held lightly by placement of index as well as thumb. Placement of thumb had been at posterior aspect of ear pinna and index finger at the ear canal's opening. The traction of auricle was based on level of discomfort that was reported by patient. Treatment consisted of three to four sets of horizontal pulls to be performed gently and moving in circular manner, with twenty five repetitions in every set and a 5-second rest between sets.[10]

The conventional physiotherapy protocol comprised of electrical stimulation, facial exercises in front of mirror and facial massage. Faradic stimulation had been given for each affected muscle. Facial massage was done using fingers or finger pads. The patient was given a massage in the form of effleurage, kneading with the fingertips, wringing and tapping. Effleurage was directed from the midline of the face just below the ear. The first stroke was taken from under the chin, the second stroke was given by spreading the fingers above and below the mouth. The third stroke started at the nose and the fourth stroke at the midline of the forehead and curved down. Kneading was started from the midline to the subauricular region. The exercises of the face to be performed by looking in mirror included to raise the eyebrows, closing eyes, clenching the teeth, smiling, and making other facial expressions. These exercises were performed for 10-15 repetitions each. The wringing technique was done with the fingertip, using pads of the index finger and thumb. It began at mouth's corner and ran to the ear and then over the chin to the other ear.[11] Tapping was done with the fingertips according to the area and face's size being treated. The first line of the exercises started under the chin, then the chin to the ear line, then the upper lip to the ear line, and then the nose to the ear line [10]



Figure: Neural Mobilization of Facial Nerve

DATA ANALYSIS:

In analyzing whole data, the 22nd version of SPSS software was used. Normality was assessed by use of Shapiro-Wilk test that showed normal distribution of data. The paired t-test was applied for the Sunnybrook Facial Grading Scale, with a 95% confidence interval. For Facial Disability Index, both components, social and physical functioning, were individually analyzed with use of Wilcoxon Signed Rank Test. Both components were found to have a p-value of 0.005.

RESULT:

The results indicated that there had been statistically significant difference between the groups. In Sunnybrook Facial Grading Scale, the paired t-test revealed a p-value less than 0.05, indicating a significant effect on the Sunnybrook Facial Grading Scale. Wilcoxon signed rank test also gave p-value of <0.05, having an indication of significant difference between Pre- and Post-intervention scores.

Table 1 Sunnybrook Facial Grading Scale

Outcome Measure	Mean Pre-Data	SD Pre-Data	Mean Post Data	SD Post Data	p-value
Sunnybrook Facial Grading Scale	26.5000	6.90008	75.8000	6.92499	0.00
FDI-Physical Function	60.0000	9.68389	82.0000	7.94425	0.005 (Z-value: -2.812)
FDI-Social Function	37.1000	14.47181	75.6000	7.54542	0.005 (Z-value: -2.805)

DISCUSSION

The study result shows that combining neural mobilization with conventional physiotherapy improves the physical function of the facial muscles. Neural mobilization, a technique based on neurodynamics, was first described by Maitland in 1985, further developed by Elby in 1986 and rediscovered by Butler in 1991. It aims to restore the nervous system's ability in tolerating compressive, frictional, and tensile force that occur during daily activities. A systematic review conducted by Richard F. Ellis found positive therapeutic benefits of using neural mobilization. Facial nerve's mobilization is newer technique that has not been widely practiced until recently. This is supported by the study of Faizan Kashoo, a case report from 2019, which found that facial nervemobilization has been safe technique that can be added to conventional physiotherapy treatment for Bell's Palsy. [10,12]

Patients suffering with this often experience altered movements of face and disfigurement, which can negatively impact both physical and social function. This can lead to psychological distress, depression, and social isolation. The symptoms of facial muscle weakness are caused by inflammation or swelling of the facial nerve. Neural mobilization, which stretches the nerve bed, lengthening the nerve and increasing interneural pressure, can reduce intraneural blood flow and oedematous neuropathy. It can also produce a 'pumping' or 'milking' effect, which has favourable consequence on neuronal hydration. Factors such as axonal transport and tissue mobility are important for the structural and functional integrity of a neuron as agreed in a study by Cleland et al, which showed that when there is compression of roots of nerve, the

compromization of microcirculation affects oedema and demyelination. Neural mobilization encourages a healthy neural environment by promoting blood flow, axonal transport, and decreasing harmful mechanical and chemical components resulting from intraneural odema. This is supported by a study by Kerry Gilbert et al in 2015 which found that simulated neural mobilization can alter the environment of neural tissue, promoting improvement in functioning and neural health by dispersion of tissue fluids and reducing pressure and oedema intraneurally. [8,14,15,16]

Electrical stimulation can prevent muscle atrophy and promote tissue healing, thereby preventing the long-term effects of Bell's Palsy. Facial exercises are also helpful in improving facial function, with the use of a mirror as a form of biofeedback to enhance voluntary muscle contraction. A Systematic Review and meta-analysis by LM Pereira and colleagues had found facial exercising therapy is efficacious for facial palsy outcomes. However, another study by Cordoso *et al* found that due to the limited amount of RCTs, it wasn't possible to determine whether mirror exercises or EMG biofeedback were efficacious. A study by Hyoung Ju *et al* in 2016 found that facial exercises including massage are an effective intervention that improves facial muscle function and decreases depression. [17,18,19,20]

CONCLUSION

The study found that the combination of neural mobilization and conventional physiotherapy is effective in enhancing functioning of patients suffering bell's palsy. It enhances recovery in patients. Hence neural mobilization can be used as an adjunct for improving the function.

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