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Efficacy of Kabat Technique V/S Neural Mobilizations in Patients with Bell`S Palsy

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ABSTRACT

Background and Purpose:
There is a paucity of effective treatment in improving facial symmetry and facial function in acute Bell's palsy. Although a variety of rehabilitative approaches have been shown to improve facial function, present study suggested that using Kabat technique and neural mobilization had superior effects. We investigated the effectiveness of Kabat technique v/s neural mobilization in improving facial symmetry and facial function.

Methodology: 30 acute Bell's palsy patients were included in this study. The patients were randomly allocated into two groups of 15 each. Group a received Kabat technique along with conventional therapy for 45 minutes, 5 days a week for 4 weeks. Group B received neural mobilization along with conventional therapy for 45 minutes, 5 days a week for 4 weeks. Facial symmetry was measured using sunny brook facial grading score (SBFGS) and facial function was measured using House brackmann grading scale (HBGS) before and after the intervention. The data was collected at the baseline and post 4 weeks intervention through HBGS and SBFGS were used for statistical analysis.

Results: The post-test mean values for the Group A on HBGS is (1.27) and for Group B is (1.47). The post-test means for Group A on SBFGS is (83.47) and for Group B is (76.00). This study found equal improvement in both the groups on HBGS ($P>0.05$) but there were superior effects on Kabat technique on SBFGS (p value < 0.01).

Conclusion: The statistical analysis helps in concluding that both Kabat technique and neural mobilization are equally effective in improving facial function but Kabat technique has superior effects in improving facial symmetry. Hence, Kabat technique and neural mobilization can be used alternatively in improve facial function but facial symmetry can be improved more by using Kabat technique.

Key Words: Bell's palsy, neural mobilization, Kabat technique, facial symmetry, facial function, House Brackmann grading score, Sunny brook facial grading score.

1. INTRODUCTION

Bell's palsy is an idiopathic, acute, unilateral paresis or paralysis of the face with peripheral facial nerve dysfunction, it may be partial or complete, occurring with equal frequency on the right and left sides of the face. Sir Charles Bell was the first to describe unilateral facial nerve dysfunction in 1830.

A range of annual incidence rates have been reported in the literature varying from 25 to 53 (all rates per 100,000 population per year). Either sex is affected equally and may occur at any age the median age is 40 years. Several risk factors associated with BP including age, pregnancy, epilepsy, obesity, hypertension, diabetes, respiratory tract infection, vaccination.

In BP, facial nerve dysfunction is due to an inflammation of a facial nerve in a canal before emerging from the stylomastoid foramen. While the exact aetiology of Bell's palsy is still largely unknown, it is thought that inflammation of the facial nerve could play a role.[14] Events such as viral infection, ischemia, Herpes Simplex, herpes zoster or Epstein Barr virus and auto immune reaction have been proposed as causes of BP. Vascular ischemia may be primary or secondary. Primary ischemia is induced by cold or emotional stress. Secondary ischemia is the result of primary ischemia which causes increase capillary permeability leading exudation of fluids, oedema and compression of micro circulation of the nerve.

The onset of Bell's palsy is sudden and usually evolves rapidly during a period of 1to 7 days, but it may also progress more slowly, reaching maximum weakness up to 1 to 3 weeks after onset.[17] The symptoms might vary from person to person and may range in mild weakness to total paralysis.[18] Clinical picture is a stereotyped, accompanied by bell's phenomenon,[19] diffused retro auricular pain in the region of the mastoid, facial weakness and asymmetry with drooling of liquids from the corner of the mouth on the affected side. Palpebral fissure is widened on the affected side, eye closure and blinking are reduced or absent, the angle of the mouth droops with reduction of the naso labial fold, loss of taste in the anterior 2/3rd of the tongue, hyperacusis.[20]

Kabat rehabilitation is a form of motor control rehabilitation technique that depends on proprioceptive neuromuscular facilitation, as the principles of KR rely coordination, and optimum body movement power, mainly because they are performed along diagonal lines regarding the body Saggital axis, thus producing a rotationl effect. KR Stimulates the voluntary response of the weakened muscle over the entire muscular section pattern that undergoes resistance, this technique is most appropriate for facial muscles, as most of the muscle fibers of the face run diagonally, with easy irradiation to the superior section of the face owing to the cross innervations of the facial nerve.[28]

Neural mobilization is a new technique in physiotherapy for the treatment of BP and it is a gentle nerve stretching technique to relieve tension and its associated symptoms.[29] It involves movements and or tension of nervous system which results in decreased intrinsic pressure of the neural tissue and may increase the tissue mobility and axonal transport which is required for the axonal and structural integrity of the neuron and may reduce the intra neural swelling and improve circulation to the nerve and remove waste products from the nerve.[30]

There are previous studies suggesting that both Kabat therapy and facial neural mobilizations added with conventional intervention were effective in improving facial symmetry and facial function. There is no

study which compares the effectiveness of Kabat therapy and neural mobilizations in BP. So the purpose of the present study is to investigate which therapy (Kabat therapy and neural mobilizations) is more effective in improving facial symmetry and facial function in Bell's palsy patients.

2. MATERIALS AND METHODOLOGY

Study design: A comparative study
Source of sample selection: Susrutha Institute of Physical Medicine and Rehabilitation.
Sample size: 30 Bell's palsy patients included in the study
Duration of the study: Study was conducted for a period of 4 weeks
Study period: 1 year
Study groups: 2 groups
Inclusion criteria:
Subjects with age 20-65 years
Subjects with Diagnosed Bell`s palsy
Non - traumatic onset
Acute onset 1 to 3 weeks
Both males and females
Patients with acute unilateral Bell's palsy, Either right or left side

Exclusion criteria:
Upper motor neuron diseases
Post surgical cases
Subjects who having other neurological disorders
Non cooperative patients
Pregnant women
Any open wounds or ulcers over face
Any traumatic injury
Bilateral facial weakness due to demyelinating neuropathy
Patient with history of metal implants
Patients with sensory impairment over face
Recurrent bell's palsy

Methods:
Kabat technique
Neural mobilizations

Outcome measures:
Facial asymmetry is measured using SUNNY BROOK FACIAL GRADING SYSTEM (SBFGS)
Facial function is measured using HOUSE BRACKMAN GRADING SYSTEM (HBGS)

Procedure:
30 patients with acute idiopathic facial palsy patients were included in this study. The patients were randomly allocated into two groups of 15 each. Prior to the treatment session facial asymmetry was assessed using Sunny Brook facial grading scale (SBFGS) and facial function was assessed using House

Brackmann grading scale (HBGS) and pre-test values were recorded. Group-A (n=15) received conventional therapy along with Kabat technique for 45 minutes, 5 times a week for 4 weeks. Group-B (n=15) received conventional therapy along with neural mobilizations for 45 minutes, 5 times a week for 4 weeks. After the intervention, the subjects were assessed again to evaluate facial asymmetry using SBFGS and facial function using HBGS and post-test values were recorded

Kabat Rehabilitation: The therapist will facilitate the voluntary contraction of the impaired muscle by applying a global stretching to the entire muscular section that undergoes resistance. This method appears to be extremely rational for facial muscles, since most of the face muscular Fibers run diagonally, with easy irradiation to the upper facial region due to the cross facial nerve innervations.

Three regional fulcra were taken into consideration: upper, intermediate and lower fulcrum. The first (forehead and eyes) is connected via a vertical axis to the intermediate one (nose), while the lower mimic-chewing-articulatory fulcrum lies along the horizontal axis. Hence, action on the upper fulcrum also involves the other two fulcra. The manipulation of these three fulcra is carried out by utilising both contralateral contractions and basic proprioceptive stimulation, including stretching, maximal resistance, manual contact and verbal input. In the upper fulcrum, the activation of the frontal, corrugators and orbicularis muscles is carried out by their upwards or downwards traction, which is always in a vertical plane depending on the specific function that needs to be activated. In the intermediate fulcrum, activation of the common elevator muscle of the ala nasi and the upper lip is also carried out using traction movements, in this case contrary to the normal direction, following a vertical line. For the lower fulcrum, the maneuvers are carried out on the risorium and orbicularis oris muscles in a horizontal plane, and on the mental muscle in a vertical plane.

During the KR performance, the motor control re-education training for the patient was performed by extrinsic feedback as visual cues by performing all exercises in front of the mirror and verbal cues inform of the therapist instructions with the tactile cues in form of manual contact of therapist and tapping that stimulating the correct contraction of every muscle and prevent the incorrect muscle contraction. The treatment duration for Kabat motor control re-education was 15 minutes/session.

Neural Mobilizations: This technique was applied when the patient was in supine position on the therapeutic table with head flat on the table in neutral rotation. The therapist used sterile gloves for protection and talcum powder to reduce friction. The therapist used one hand to perform facial nerve mobilization, while the other hand was used to stabilize the patient's head by placing the palm on the unaffected side of the face. The hand placement on the affected side is such that the therapist's index finger circle behind the auricle of the ear and the thumb is gently placed at the opening of the external auditory meatus. The intensity of the manipulation is decided by the patient reporting the level of discomfort. The force used in the traction is produced by gently moving the wrist in extension and circular manipulation from the elbow and shoulder joint. The circular movement and horizontal traction were applied 25 times in 3 sets per session with a 5 second rest period in between a single manipulation and a 30 sec rest period.

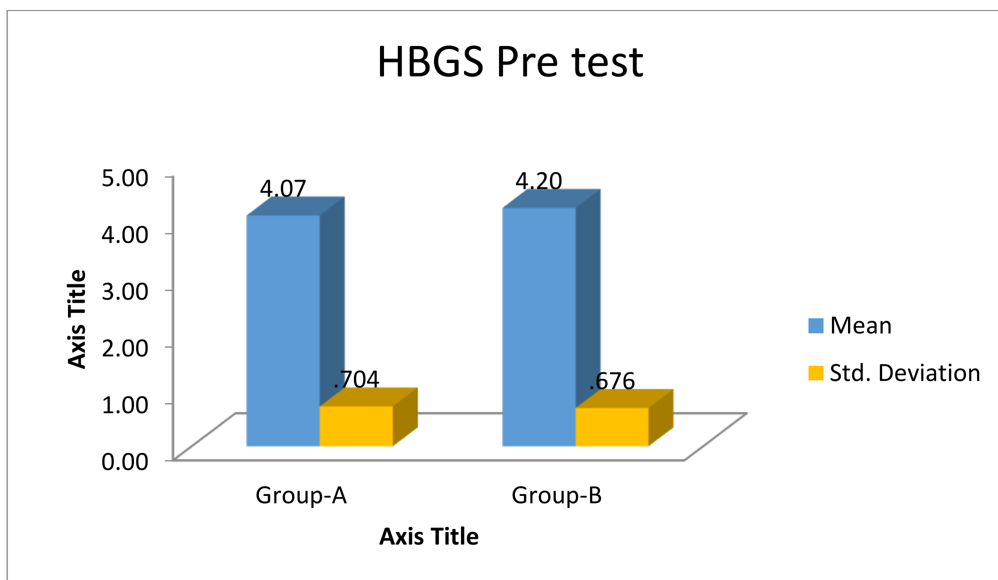
Conventional therapy:
Conventional therapy includes electrical stimulation, facial massage and facial expression exercises.

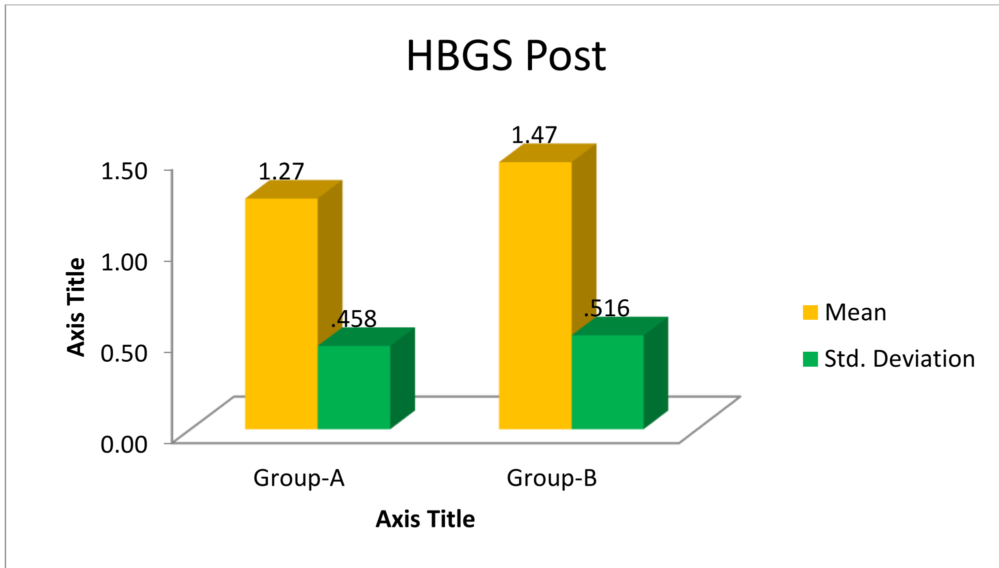
Electrical stimulation: In the supine lying posture, an inactive electrode was inserted at the nape of the neck, and the face muscles were stimulated with a pen electrode (active electrode). Both groups were treated with Galvanic current to stimulate the facial muscles and faradic current was used for each facial nerve trunks. Mode with100 millisecond intermittent galvanic current for motor point treatment, 30 times to each point, and at a current intensity as to obtain minimum contraction. 30 contractions were given to each muscle and 10 contractions were given to each facial nerve trunk. Electrical muscle Stimulation was given for 10 minutes in each session.

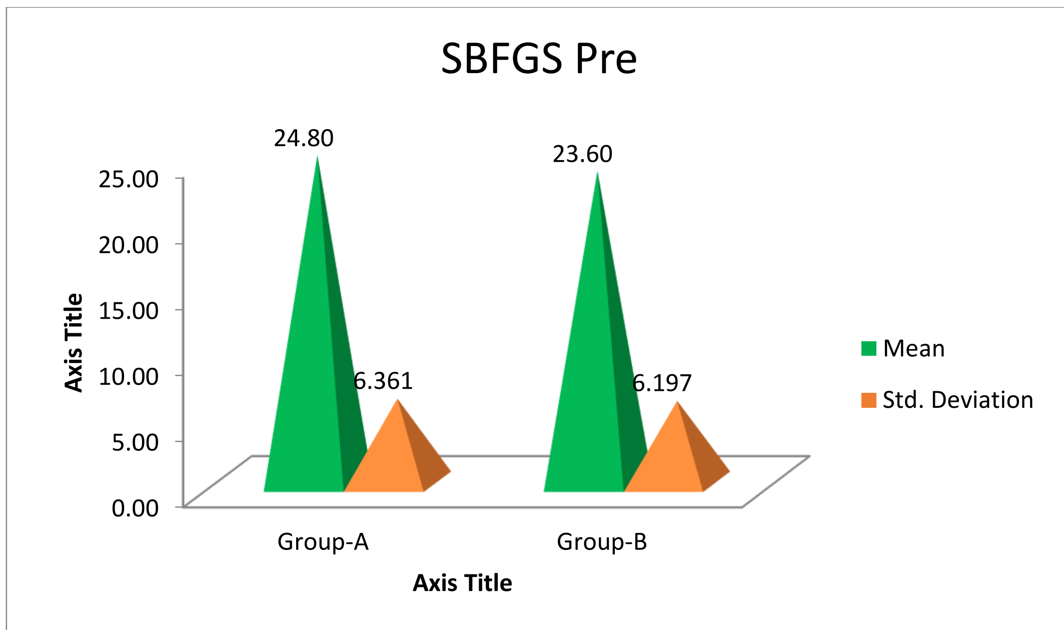
Motor points of facial nerve:
Temporal branch –frontalis, corrugators, orbicularis oculi.
Zygomatic branch- orbicularis oculi, nasalis
Buccal branch- procerus, risorius, buccinators, levator labii superioris, levator anguli oris, nasalis, orbicularis oris.
Marginal Mandibular branch- mentalis, depressor labii inferioris, depressor anguli oris.
Cervical branch.
The facial massage was applied while the patient was in the supine position. The massage was applied for 10 minutes on both sides of the face and neck. Commonly massage techniques include - stroking, effleurage, finger or thumb kneading, and hacking.

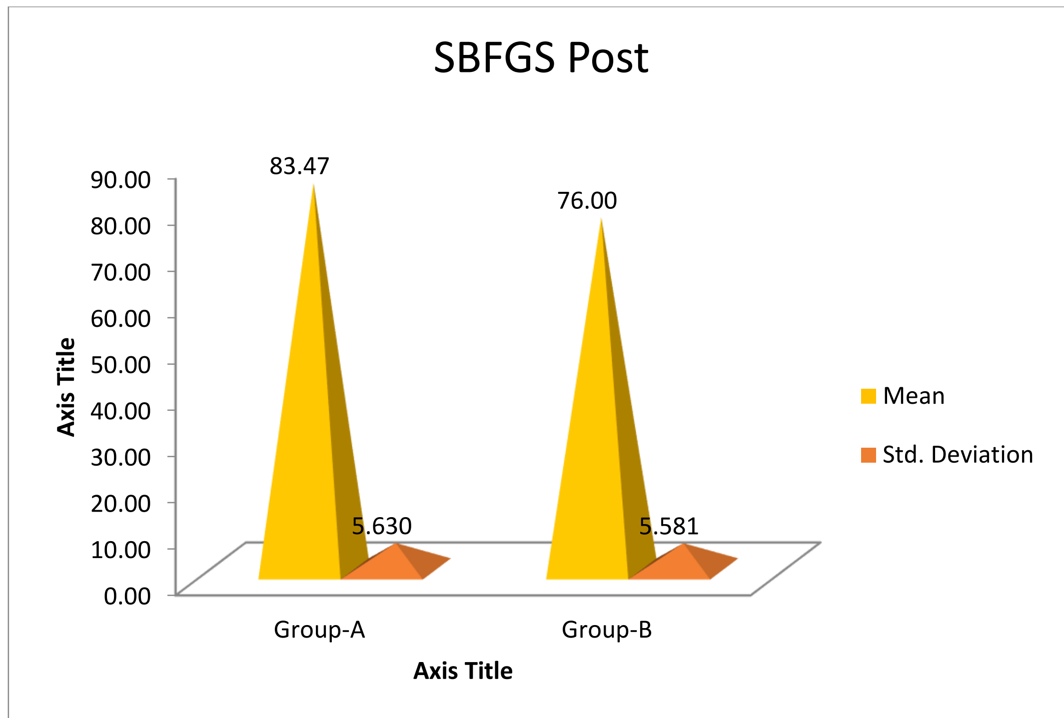
Facial expression exercises including raising of eyebrows, flaring of nostrils, gentle and forced eye closure-opening, smiling with lips closed, sucking or sipping, joining lips or puffing, crying expression, forehead wrinkling, flaring nose, sucking cheeks between upper and lower teeth, laughing expression, clenching the teeth, pronouncing vowels, balloon blowing, blowing the straw from right side of mouth, sucking water using straw, jaw and mouth movement, snarling, lip puckering and pouting were performed once at the clinic and 3-4 times at home per day infront of a mirror. Each exercise was performed 10 times.

3. RESULTS:




HBGS Post
1.50
1.00
0.50
0.00
Axis Title
1.27
.458
1.47
.516
Group-A
Group-B
Axis Title
Mean
Std. Deviation


SBFGS Pre
25.00
20.00
15.00
10.00
5.00
0.00
Axis Title
24.80
6.361
23.60
6.197
Group-A
Group-B
Axis Title
Mean
Std. Deviation



4. DISCUSSION

The primary objective of the present study was to compare the effectiveness of Kabat technique and neural mobilization in improving facial symmetry and facial function. This study includes 30 patients with Bell's palsy who met the inclusion criteria. They were randomly divided into two groups of 15 each. Group – A received Kabat therapy along with conventional therapy whereas Group – B received Neural mobilization along with conventional therapy for 5 days a week for 4 weeks were assessed using SBFGS and HBGS.

HOUSE BRACKMANN GRADING SYSTEM:

The current study states that there is significant improvement in facial function in both groups, The mean values for pre and post-test on HBGS for Group A & Group B are, pre-test values for Group A is 4.07 and Group B is 4.20, whereas post-test values for Group A is 1.27 and Group B is 1.47, indicating that Group A has more significant improvement in improving facial function in patients with BP

SUNNY BROOK FACIAL GRADING SYSTEM:

The current study states that there is significant improvement in facial asymmetry in both groups, The mean values for pre and post-test on SBFGS for Group A & Group B are, pre-test values for Group A is 24.80 and Group B is 23.60, whereas post-test values for Group A is 83.47 and Group B is 76.00, indicating that Group A has more significant improvement in improving facial asymmetry in patients with BP

The Study suggest that both the groups showed significant improvement in facial symmetry and facial function on HBGS and SBFGS which are very reliable and valid tools for measuring facial asymmetry and facial function. However better improvement was seen in Group A (Kabat technique + conventional therapy) than Group B (neural mobilisations + conventional therapy) in improving facial symmetry and facial function.

The better improvement seen in Kabat group may be due to the stimulation of proprioceptors, by applying resistance in combination with traction movements, it is able to evoke and restore the neuromuscular circuits by facilitating a response of neuromuscular mechanism and it may also lower the synaptic threshold of alpha motor neuron and facilitates the passage of impulse and produce a movements response. Kabat technique generates appropriately forceful muscle contraction by using diagonal pattern of stretching. The contractions of muscle on stronger side will facilitates and reinforce the action on the more affected side and also by preventing full motion on the stronger side will promote activity and increase the strength on the weaker side by irradiation and these makes early recovery which makes Kabat technique more effective, this could be the mechanism behind improvement in house brackmann grading system and sunny brook facial grading system.

Qamar et al, stated that KR group showed a significant improving effect on facial asymmetry, as the KR improves circulation and both the gross and precise activation of facial muscles.
Robinson states that Kabat physical rehabilitation induced an increase in facial muscle tone in the affected side and on the contralateral one, with functional and esthetic improvements. The rehabilitation, when applied at an early stage, produced better and faster recovery.

Khanzada et al compared the effects of KR and exercises of facial muscles combined with nerve stimulation in patients with bell's palsy and found that after 3 weeks of treatment, the KR group showed more improvement in SBFGS, with a mean post-treatment of 81.58, while the facial exercises group had a mean post-treatment of 63.77. The current study values co related with this values in improving facial symmetry in SBFGS.

The improvement seen in neural mobilization that may be due to the facilitation of nerve gliding in the canal, which result in decreased intrinsic pressure of the neural tissue, increase the tissue mobility and axonal transport which is required for the axonal and structural integrity of neuron, reduce the intraneural swelling, remove waste product from the nerve, reduced nerve adherence, dispersion of noxious inflammatory agents, increased neural blood supply and improved exoplasmic flow. The sedative effect of the facial nerve mobilisation technique on nociceptive nerve fibres is likely to reduce inflammation and oedema surrounding the nerve and ultimately there was an indirect effect on muscle, this could be the reason behind improvement in modified house brackmann scale and sunny brook facial grading scale.

Cleland et al presented that neural mobilizations consist of short oscillatory movements which is sufficient to disperse the oedema, thus alleviating the hypoxia and reducing the associated symptoms, It could also be directly associated with reduction in the neurogenic inflammation.

MC Gill stated that neural mobilization was performed for reducing pressure caused by intraneural and extraneural fibrosis, increasing vascular and axoplasmic flow, and restoring tissue mobility thus improving functional activity.

Raed Alharbi, et al compared the effect of neural mobilization and conventional therapy in patients with bell's palsy and found that after 3 weeks of treatment, the neural mobilisation group show more improvement in SBFGS with a mean values for pre and post test are 5.77 and 81.5, he showed that facial neural mobilization is likely to be an effective adjunctive intervention in addition to conventional therapy

in improving facial symmetry. The current study values co related with this values in improving facial symmetry in SBFGS.

However, subjects in the Kabat rehabilitation group showed more improvement than neural mobilization may be due to the Kabat technique directly targets the muscles and there is active contraction of the muscle in this technique whereas neural mobilization has an indirect effect on muscle via the nerve. Neural mobilization acts through mechanical interference and there is no active contraction of the muscles occurring in this technique The direct effect of Kabat technique on facial muscles could be the probable reason for the better results of the Kabat technique than neural mobilization

5. CONCLUSION:

This study was conducted to compare the effectiveness of Kabat technique and Neural mobilizations along with conventional therapy in improving facial asymmetry and facial function. The results of the study conclude that both the groups had a significant improvement in facial symmetry and facial function.

The result from our outcome measures provides absolute evidence by which we can conclude that Kabat technique and neural mobilization are equally effective in improving facial function, but Kabat technique had superior effects than in improving facial asymmetry along with conventional therapy in patients with Bell's palsy.

The outcome measures of this study are SBFGS and HBGS which are very valid and reliable measures for assessing facial asymmetry and facial function in patients with Bell's palsy.

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