Effect Of Electrical Stimulation On Facial Grading System In Subjects With Early Facial Palsy

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Abstract: Aim and Purpose: Most patients with facial palsy experience spontaneous recovery by 3 weeks to 3 months. As electrical stimulation is a popular intervention the study was conducted to explore it as an option for enhancing recovery in patients with facial palsy. So the aim of the study was to determine the potential efficacy of applying electrical stimulation to facial nerve trunks in early phase of facial nerve palsy of idiopathic onset. Methodology: The study design was a pretest – post test control V/S experimental group, with a sample size of 50 subjects. Convenient sampling was used and subjects were randomly allocated into two groups. The outcome measure used was the Facial Grading System Score (FGS). The inclusion criteria were males and females aged 15-65 years with a clinical diagnosis of lower motor neuron facial palsy of idiopathic origin of less than 7 days onset. The exclusion criteria were subjects with a known cause of facial palsy with onset less than 7 days. Group A was given heat in the form of Infra Red to the ear and face on affected side for 10 minutes for 1 week. Electrical Stimulation for next 3 weeks to affected facial nerve trunk branches was then given. Parameters used were Surged Faradic Current with pulse duration 0.1ms, pulse frequency 50 Hz, and surge duration: interval ratio was 5:5. Intensity was increased to produce mild contraction of facial muscles stimulated at nerve trunk branch. 15 contractions daily were given. Both Group A and B subjects were explained the condition, taught exercises, and given advices about care required. Subjects in group B were asked to follow up after 4 weeks. Data was analyzed using SPSS. Level of significance was kept at 5%. Results: For group A and B difference in mean values of facial grading system scores at end of 4 weeks was found to be statistically significant ($z=4.861$, $z= 4.016$ respectively, $p < 0.001$). However at the end of 4 weeks difference in median values between the groups was not found to be statistically significant ($z=0.420$, $p=0.675$) Conclusion: Outcome demonstrates neither benefit nor harm with electrical stimulation in subjects with early facial palsy. [Sheth M S et al NJIRM 2013; 4(3) : 29-32]

Key Words: facial palsy, electrical stimulation, physical therapy

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Introduction: Facial paralysis may be due to a supranuclear or upper motor neuron lesion involving voluntary facial movement, a supranuclear lesion involving emotional movements, leading to mimic paralysis or a lesion involving lower motor neurons in the nucleus or facial nerve or a disorder of facial muscles. [1]

Bell's palsy has been defined as a facial paralysis of acute onset attributed to a non-suppurative inflammation of facial nerve within stylomastoid foramen.[1] The cause is mostly unknown but it may follow infection of the nasopharynx, or an exposure to cold. Spontaneous recovery of Bell's palsy is generally seen by 3 weeks to 3 months. According to Ljostad et al, 68% patients of acute Bell's palsy reported complete recovery, 27% progressed to good recovery, and only 5% remained with partial recovery.[2] Treatment of Bell's Palsy is controversial due to lack of randomized controlled prospective studies.[3] Analgesics, corticosteroids, and antiviral drugs are the mainstay of treatment at present. Electrical stimulation (ES) of paralyzed muscles is a popular intervention. However there are only few controlled trials available on effectiveness of physical therapy.[4] Therefore the aim of this study was to determine the potential efficacy and safety of short pulse duration electrical stimulation to facial nerve trunks in early phase of facial nerve palsy of idiopathic onset.

Materials and Methods: The study design was a pretest – post test, control V/S experimental group, with a sample size of 50 subjects. Convenient sampling was used to select subjects. The outcome measure used was the Facial Grading System Score (FGS). The inclusion criteria were males and females aged 15-65 years with a clinical diagnosis of lower motor neuron facial palsy of idiopathic origin of less than 7 days onset. The

exclusion criteria were subjects with a known cause of facial palsy with onset more than 7 days.

Data collection: It was an open label randomized controlled study carried out at V.S. general hospital from May 2010 to December 2010. Subjects diagnosed with facial palsy referred from ENT OPD of V. S. General Hospital, Ahmedabad were included and the study procedure was explained. Written informed consent of the subjects willing to participate in the study was taken. They were evaluated and FGS scores were taken. Subjects were then randomly allocated using random number table to Group A or Group B. Both Group A and B subjects were explained the condition. They were taught exercises which were to be done 3 times in a day, 15 times each. They were asked to close and open their eyes as tightly as possible, ballooning of the cheeks, showing of the teeth and pursing of the lips as in whistling. Both Group A and B subjects were explained the condition. Both groups were given advice as follows. Protect eyes from sunlight, wind by the use of dark glasses or plain glasses. Use prescribed eye drops. Wash eyes frequently. Close eyes with back of finger. Protect ears from cold blow. Avoid taking cold foodstuff.

Antiviral therapy as prescribed by the ENT OPD was continued for the groups. A follow up was taken every week for 4 weeks.

Group A was given heat in the form of Infra Red to the ear and face on affected side for 10 minutes for 1 week. Electrical Stimulation for next 3 weeks to affected facial nerve trunk branches was then given. Parameters used were Surged Faradic Current with pulse duration 0.1ms, pulse frequency 50 Hz, and surge duration: interval ratio was 5:5. Intensity was increased to produce mild motor stimulation. 15 stimulations daily were given at each nerve trunk.

Statistical Tests: Wilcoxon Signed-Ranks test for within the group differences and Mann Whitney U Test for between groups differences were used for analysis. Level of significance kept at 5%. SPSS version 16 software was used for analysis.

Results: The mean age of subjects in Group A was 52 (SD 3.2) years and in Group B was 54 (SD 2.6) years. There were 10 females and 15 males in Group A and 11 females and 14 males in Group B.
The FGS scores in Group A ranged from 9 to 66 before intervention and from 19 to 100 after intervention. The FGS scores in Group B ranged from 5 to 62 before intervention and from 33 to 100 after intervention.Mean FGS scores in Group A and in Group B before and after intervention are shown in graphs 1 and 2. Table 1 shows the mean differences in Group A and B after intervention.

Table 1: Mean differences in Group A and B after intervention.

Group	A	B
Mean Diff FGS Scores	43.06452	43.71429
Sd	18.93486	18.33887

Table 2: Significance Within Groups

	z VALUE	p VALUE
Group A	-4.861	<0.001
Group B	-4.016	<0.001

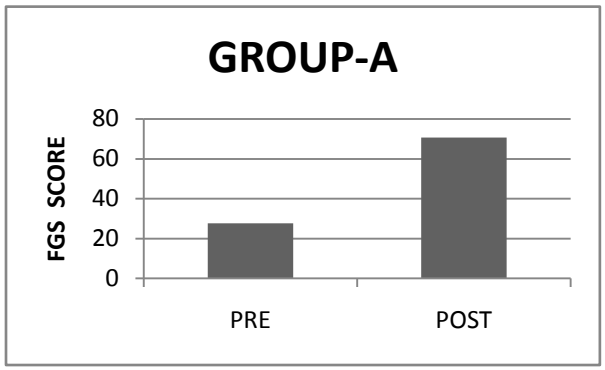
Table 2 shows that there was statistically significant difference in both groups A and B at the end of 4 weeks.
z value of 0.42 with p =0.675 shows no statistically significant difference between groups A and B after 4 weeks.

Discussion: In the present study, in group A, subjects with facial palsy were treated with electrical stimulation and facial muscle exercises and in group B with only exercises for 4 weeks.

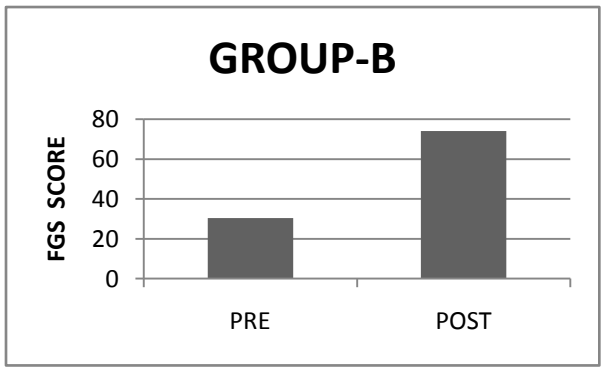
Statistically significant difference was seen in both the groups with no significant difference seen between both the groups.

Facial palsy seen is, nearly 80% of the times, because of compression of the facial nerve within the facial canal. The recovery here is spontaneous with relief of the compression, with no intervention required for the nerve or muscles.

Graph 1: Mean FGS scores in Group A before and after intervention



Graph 2: Mean FGS scores in Group B before and after intervention



According to Shafshak et al (2006) there may be a controversy about the role of physiotherapy in facial palsy. Local superficial heat therapy, massage exercises, electrical stimulation and biofeedback training have a place in the treatment of lower motor neuron facial palsy. However, each modality has its indications.[5] In a study by Cederwall et al (2006) subjects with facial palsy were asked to perform an exercise program twice daily, which included movements of the muscles surrounding the mouth, nose, eyes and forehead. All the patients improved in terms of symmetry at rest, movement and function. They concluded that patients with remaining symptoms of Bell's palsy appear to experience positive effects from a specific training program.[6] This is in accordance with the above study where a significant difference is seen in the control group given exercises only.

Similar to findings of the above study, a study by Prisha Alakram (2010) concluded that ES was safe but may not have any added value over spontaneous recovery.[7] According to a study by Targan R et al (2000) ES may facilitate partial reinnervation in chronic facial paresis.[8] A study as old as in 1958 showed ES (using Interrupted Galvanic current) resulted in neither harm nor benefit in Bell's Palsy (Mosforth).[9] A study by Farragher (1987) used Eutrophic stimulation on 40 patients with pulse duration 80 microsec and frequency and pattern matching healthy facial muscles.[10] They concluded that ES may benefit in facial palsy. However the study lacked a control group.

A systemic review in 2008 identified 45 potentially relevant articles. Three trials studied the efficacy of electrostimulation (294 participants) and three articles studied exercises (253 participants). Neither treatment produced significantly more improvement than the control treatment or no treatment. There was limited evidence that improvement began earlier in the exercise group. They concluded there is no evidence of significant benefit or harm from any physical therapy for idiopathic facial paralysis. The possibility that facial exercise reduces time to recover and sequelae needs confirming with good quality randomised controlled trials.[11]

Studies also say that induced exercises via ES require long pulse duration currents in the presence of denervation. Short pulse duration (SPD) currents as Surged Faradic may not induce contractions in the presence of denervation. If improvement occurs with SPD currents it is a result of mechanism other than induced exercise.[11] In partially denervated fibers ES may suppress chemical mediators required for reconnection of axon twig with motor end plate on the muscle as well as decrease random electrical activity of the orphaned muscle fibre.[12] ES of muscle fibers that retain partial nerve supply may simulate volume muscle overuse and contribute to suppression of chemical mediators required for reinnervation of denervated fibers.[13]

In the present study FGS scores were not correlated with SDC or NCV studies which would be a more objective measure of structural impairment of the nerve injury.

As a future study the effect of stimulation in facial palsies which did not recover spontaneously can be studied. Effect of stimulation in relation with type of nerve injury, i.e. where axonal degeneration is present can be conducted.

Conclusion: Outcome demonstrates statistically significant difference in both groups at the end of 4 weeks in subjects with Facial palsy of idiopathic origin and acute onset. No statistically significant difference was seen between the groups given electrical stimulation and given exercises alone. No harm or additional benefit was seen with ES, so it may be safe in early stages of Facial Palsy of unknown cause.

Clinical Significance: In the initial 4 weeks following facial palsy, facial muscle exercises and counseling is sufficient in the management of subjects with Facial palsy of acute onset and idiopathic origin. Other studies conclude on deferring stimulation for at least 3 months. Conservative approach (exercises alone) is cost effective and safe.[12]

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