International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 7; Issue 1(I); January 2018; Page No. 9347-9350
DOI: http://dx.doi.org/10.24327/ijcar.2018.9350.1542

Research Article

# COMPARISION OF PNF VERSUS CONVENTIONAL EXERCISES FOR FACIAL SYMMETRY AND FACIAL FUNCTION IN BELL'S PALSY

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**A R T I C L E I N F O**

***Article History:***

Received 11th October, 2017
Received in revised form 10th November, 2017
Accepted 26th December, 2017
Published online 28th January, 2018

***Key words:***

Bell's palsy, Electrical stimulation, PNF, facial disability index, sunny brook facial grading system

**A B S T R A C T**

***Objective***

The objective of this study is to compare the effects of PNF (proprioceptive neuromuscular facilitation) versus conventional exercises in subjects with Bell's palsy for improving facial symmetry and facial motor function.

***Background of the Study***

Bell's palsy is a lower motor lesion of facial nerve that causes unilateral paralysis of facial muscles. Bell's palsy can recover with or without treatment. Most people notice an improvement in 2 to 3 weeks but a complete recovery can take up to 9 months. Physiotherapy treatment is found to fasten the recovery. Hence this study was intended to compare the effects of PNF and conventional exercises in accelerating the recovery of facial function and facial symmetry.

***Methods***

A group of 20 subjects who met the inclusion criteria were randomized into two groups. Group A received PNF along with electrical stimulation and group B received conventional exercises along with electrical stimulation for 6 weeks. Sunny brook facial grading and facial disability index were administered to find the progression in facial symmetry and facial function respectively.

***Results***

Statistically the calculated 't' value for Sunnybrook facial grading system as well as functional disability index was significantly higher in group A, who received PNF along with electrical stimulation which means PNF added along with electrical stimulation has a greater effect on the recovery of Bell's palsy.



## INTRODUCTION

Face is considered to be emotionally and cosmetically important organ of human body. Bell's palsy is an acute LMN facial paralysis related to inflammation and swelling of facial nerve within the facial canal or at the stylomastoid foramen(1). It is usually unilateral, rarely bilateral and may occur repetitively. Facial nerve can lose function overnight without any unknown cause characterized by total paralysis of the muscles of the facial expression on that side. The muscles of the affected side become sag and the normal lines around the lips, nose and forehead become depressed. When the patient attempts to smile, the corner of the mouth on the paralyzed side does not move and saliva may gush from between the lips of paralyzed side. The cheek may puff out during expiration because of the buccinators muscle paralysis. In patients with severe facial nerve paralysis, facial synkinesis will inevitably develop. The possible causes are history of exposure to extreme cold, water retention in pregnancy, infection of the ear, herpes zoster infection and upper respiratory tract infection. Bell's palsy is not as uncommon as is generally believed. Worldwide statistics set the frequency at just over .02%. The incidence of Bell's palsy in India is 20-30 cases for 100,000 people and accounts for 60- 70% of all cases of unilateral peripheral facial palsy(2). Either sexes are equally affected and may occur at any age but the peak incidence is noted at 40's. Electrical Muscle Stimulation (EMS): Electrical stimulation stimulates muscles, nerves or a combination of both. The physiological effects of stimulation are used therapeutically to strengthen muscles, assist in wound healing, relieve pain and reduce edema(3). Facial muscle expression exercises: Numerous muscles may act together to create movement (e.g., grimace), or movement may occur in a single area (e.g., as in raising an eyebrow). Loss of function of the facial muscles interferes with the ability to communicate

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feelings through facial expression. When the facial muscle exercises are performed in front of the mirror, he gets visual feedback and can perform the exercises more efficiently.(4)
PNF procedures consist of facilitating the voluntary response of an impaired muscle and emphasizes accuracy of facial movement patterns of isolated muscle control which undergoes resistance and it excludes exercises that promote mass contraction of muscles related to more than one facial expression (synkinesis)(5).Individually The objective of this study was to compare the effects of PNF and conventional exercised in accelerating the recovery of facial function and facial symmetry.

## METHODOLOGY

A group of 20 subjects who met the inclusion criteria were randomized into two groups. Group A received PNF along with electrical stimulation and group B received conventional exercises along with electrical stimulation for 6 weeks. (5 days /week, 45 minutes for each session). Sunnybrook facial grading and facial disability index were administered to find the progression in facial symmetry and facial function respectively.

### *Inclusion Criteria*

- Age group between 20 to 50 years.
- Patients with unilateral Bell's palsy.
- Both sexes were included.

### *Exclusion Criteria*

- Bilateral facial weakness due to demyelinating neuropathy.
- UMN facial paralysis.
- Patients with metal implants.
- Patients with sensory impairment over the face.
- Patients with ear pain otitis media or any other ENT impairments.
- Any open wounds or ulcers.

### *Procedure*

Subjects in group A and group B received electrical stimulation with interrupted direct current having a pulse duration of 100ms. 30 contractions per motor point once per day for five days per week for six consecutive weeks was given

### *Outcome Measures*

- Sunnybrook facial grading score
- Facial disability index

## DATA ANALYSIS AND RESULT

### *Sunny Brook Facial Grading Scale (Facial Symmetry)*

The mean, standard deviation and dependent 't' value of all subjects with respect to pre-test evaluation of experimental group.

**Table 1** Experimental group (group a – with pnf)

| S.No | Sunny Brook Scale | Improvement | | | Dependent 't' value |
|---|---|---|---|---|---|
| | | Mean | Mean Difference | Standard Deviation | |
| 1. | pre-test | 32.2 | 41.4 | 5.40 | 24.2 |
| 2. | post-test | 73.4 | | | |

The calculated 't' value is 24.2 which is greater than the tabulated 't' value 1.833 at 5 percent significant level. Therefore, there is a significant improvement.

| Group-a (pnf) along with electrical stimulation | Group-b(conventional exercises) along with electrical stimulation |
|---|---|
| Techniques of PNF is applied to facial motions include pressure, stretch, resistance, reinforcement, repeated contractions and reversal of antagonistic. Relaxation techniques may be used as indicated. The physical therapist uses the tipsof the fingers as manual contacts. Stronger motions are resisted inorder to stimulate and reinforceweaker motions. | Conventional exercises are done in front of mirror to make the patient visualize the movement on good side and recreate the same action on the affected side by avoiding synkinesis. |
| Frontalis: ask the patient to lift eye brows up, look surprised wrinkle your forehead. - Apply resistance to the forehead, pushing caudally and medially. This motions works with eye opening. It is reinforced with neck extension | Ask the patient to gently raise eyebrows, can help the movement with fingers |
| Muscle corrugators supercilii: ask the patient to pull eye brows down (frown) - Applyresistance just above the eye brows diagonally in a cranial and lateral direction. This motion works with eye closing. | Ask the patient to draw his/her eyebrows together to frown |
| Muscle orbicularisoculi: ask the patient to close the eyes. Separate exercise for upper and lower eye lids. - Avoid putting pressure on the eyeballs. | Ask the patient toplace back of index finger on eyelid,to keep the eyeclosed. Then tryand gently press the eye lids together and narrow eyesas iflooking into thesun |
| Muscle procerus: ask the patient to wrinkle your nose. - Apply resistance next to the nosediagonally down and out. This muscleworks with muscle corrugator with eye closing. | Ask the patient to wrinkle up the nose, take a deep breath through nose, try and flare nostrils |
| Muscle orbicularis oris: ask the patient to purse the lips whistle and say prunes. - Apply resistance laterally and upward to the upper laterally and downward to the lower lip. | Ask the patient to try and move corners of mouth outwards and keep the movement the same on each side of the face. He can use fingers to help. Once in position try to hold that smile. |
| Muscle mentalis: ask the patient to wrinkle the chin. - Apply resistance down and out of the chin. | Ask the patient to slowly pucker the mouth and then relax |

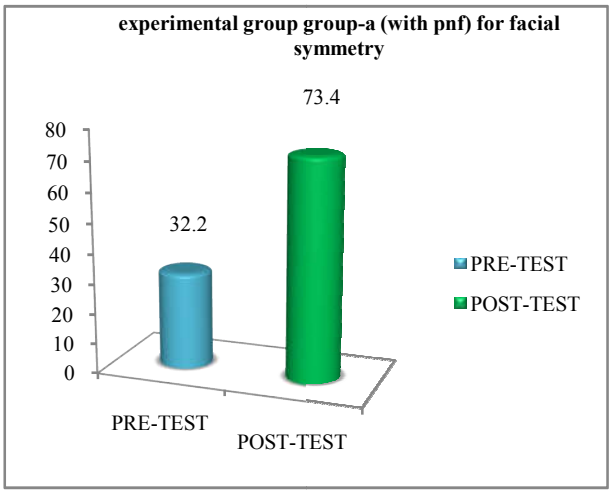


**Table 2** Control group (group b – with conventional exercises) The mean, standard deviation and dependent 't' value of all subjects with respect to pre-test evaluation of control group.

| S.no | Sunny Brook Scale | Improvement | | | Depen-Dent 't' value |
|---|---|---|---|---|---|
| | | Mean | Mean Difference | Standard Deviation | |
| 1. | Pre-test | 32.5 | 26.3 | 11.1 | 7.47 |
| 2. | Post-test | 58.8 | | | |

The calculated 't' value is 7.47 which is greater than the tabulated 't' value 1.833 at 5 percent significant level.Therefore, there is a significant improvement.

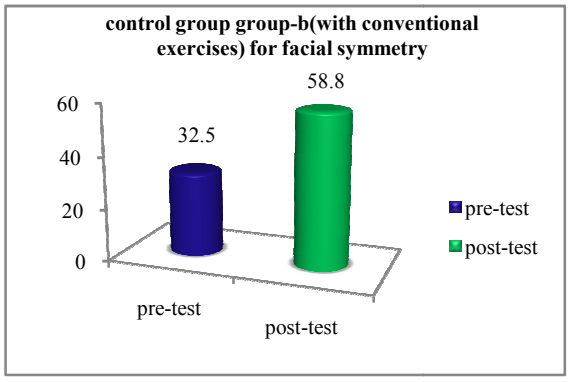
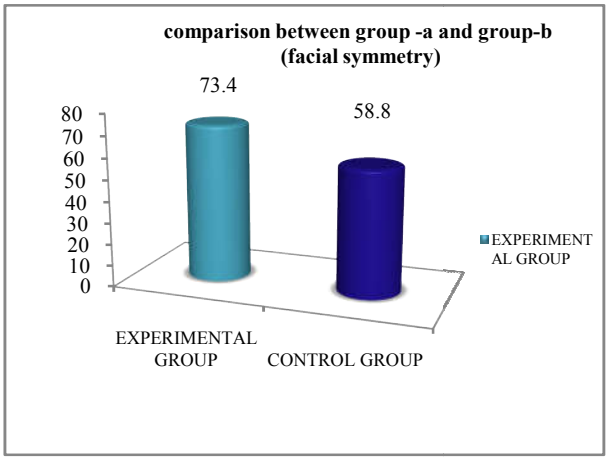



**Table 3** experimental group and control group the comparison of post treatment mean, standard deviation and independent 't' value in facial symmetry.

| s.no | sunny brook scale | improvement | | | Indepe -ndent 't' value |
|---|---|---|---|---|---|
| | | mean | mean difference | standard deviation | |
| 1. | group a | 73.4 | 15.6 | 5.68 | 5.75 |
| 2. | group b | 58.4 | | | |

The analysis of data showed that the calculated value is 5.75 which is greater than the tabulated 't' value which is 1.734 at 5 percent significant level. Thus there is a significant improvement in group A.




## *Facial disability index (facial muscle physical function)*

**Table-4** Experimental group (group a – with pnf) the mean , standard deviation and dependent 't' value of all subjects with respect to post-test evaluation of experimental group.

| S.no | Facial Disabi-lity Index | Improvement | | | Dependent 't' value |
|---|---|---|---|---|---|
| | | Mean | Mean Difference | Standard Deviation | |
| 1. | pre-test | 30.5 | 49 | 9.94 | 15.6 |
| 2. | post-test | 79.5 | | | |

The calculated 't'value is 15.6 which is greater than the tabulated 't'value 1.833 at 5 percent significant level. Therefore, there is a significant improvement.

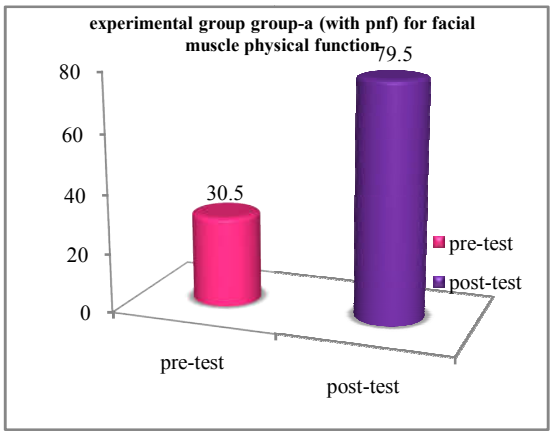



**Table 5** Control group (group b – with out pnf)the mean , standard deviation and dependent't' value of all subjects with respect to post-test evaluation of control group.

| S.No | Facial Disabi-lity Index | Improvement | | | Depen-dent 't' value |
|---|---|---|---|---|---|
| | | Mean | Mean Difference | Standard Deviation | |
| 1. | pre-test | 30 | 20.5 | 8.96 | 7.25 |
| 2. | post-test | 50.5 | | | |

The calculated 't'value is 7.25 which is greater than the tabulated 't' value 1.833 at 5 percent significant level.Therefore, there is a significant improvement.

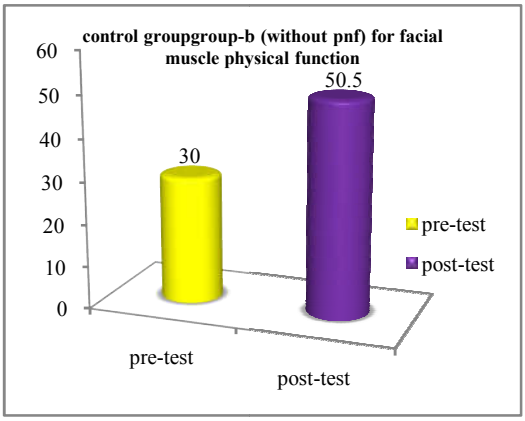
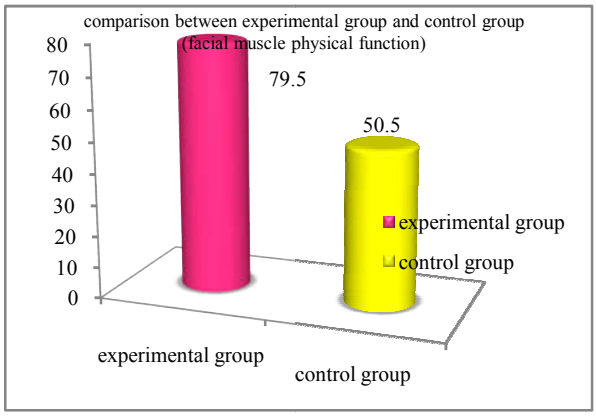



**Table 6** Experimental group and control group the comparison of post treatment mean, standard deviation and independent 't'value in facial muscle physical function.

| S.No | Facial Disabi-lity index | Improvement | | | Indepe-ndent 't' value |
|---|---|---|---|---|---|
| | | Mean | Mean Difference | Standard Deviation | |
| 1. | pre-test | 79.5 | 29 | 7.62 | 8.51 |
| 2. | post-test | 50.5 | | | |

The analysis of data showed that the calculated value is 8.51 which is greater than the tabulated 't' value which is 1.734 at 5 percent significant level. Thus there is a significant improvement in experimental group.



## DISCUSSION

The purpose of the study was to find out the effectiveness of proprioceptive neuromuscular facilitation (PNF) along with electrical stimulation in improving facial symmetry and facial muscle physical function in lower motor neuron Bell's palsy. Both the groups group A and group B had shown improvements in facial muscle physical function and facial symmetry which was assessed using Sunnybrook facial grading system and facial disability index.

However better improvements were seen in facial symmetry and facial muscle physical function among the individuals in group A who received electrical stimulation along with proprioceptive neuromuscular facilitation. Just like Mari Namura *et al* found PNF was effective in sharpening the mouth and submandibular region and might be useful for perioral muscles to adapt to the alterations following orthodontic treatment as PNF improves the facial function by initiating the voluntary effort via proprioceptive stimulation(6). Hence, it can be recommended that PNF can be used as an adjective to electrical stimulation in improving facial symmetry and facial muscle function in persons with Bell's palsy.

## CONCLUSION

Bell's palsy is manifested due to various unknown causes. PNF for facial muscles can be used as an adjective in physiotherapy treatment for early and better facial function and for complete recovery following Bell's palsy.

***Limitations***

i. Only patients with lower motor neuron bell's palsy were included.
ii. The age group was limited 20 to 50 years.
iii. Small sample size.
iv. Short study duration.

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**How to cite this article:**

Tharani, G *et al* (2018) 'Comparision of Pnf Versus Conventional Excercises for Facial Symmetry and Facial Function in Bell's Palsy', *International Journal of Current Advanced Research,* 07(1), pp. 9347-9350.
DOI: http://dx.doi.org/10.24327/ijcar.2018.9350.1542

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