EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FECILITATION AND NEUROMUSCULAR RE – EDUCATION FOR REDUCING FACIAL DISABILITY AND SYNKINESIS IN PATIENTS WITH BELLS PALSY

A COMPARATIVE STUDY

A project submitted towards partial fulfillment of the requirements of for the degree of

MASTER OF PHYSIOTHERAPY

Submitted by
Register number: 271720202

under the guidance of
Prof. Dr. PRADEEPA.M
MPT(NEUROLOGY), MIAP

Submitted to
THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY
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MAY 2019

CERTIFICATE - I

This to certify that the project work entitiled **“EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION AND NEUROMUSCULAR RE-EDUCATION FOR REDUCING FACIAL DISABILITY AND SYNKINESISIN PATIENTS WITH BELLS PALSY A COMPARATIVE STUDY"** was carried out by Reg**.No.271720202**, **PPG College of physiotherapy,Coimbatore-35,** affiliated to The **Tamilnadu Dr. M.G.R Medical University , Chennai – 32.** This work was done under the supervision and guidance of **Prof.Dr.PRADEEPA, MPT (NEUROLOGY), MIAP.**

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MPT(ORTHOPEDICS),MIAP.,Ph.D.,

PRINCIPAL

CERTIFICATE - II

This is to certify that the project work entitled **"EFFECTIVENESS PROPRIOCEPTIVE NEUROMUSCULAR RE-EDUCATION FOR REDUCING FACIAL DISABILITY AND SYNKINESISIN PATIENTS WITH BELLS PALSY A COMPARATIVE STUDY"** was carried out by **Reg. No.271720202 PPG College of physiotherapy, Coimbatore-35,** affiliated to **the Tamilnadu Dr. M. G. R medical university, Chennai-32**, under my guidance and direct supervision

GUIDE

Prof. Dr.PRADEEPA.M.,
MPT (NEUROLOGY),MIAP

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EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FECILITATION AND NEUROMUSCULAR RE – EDUCATION FOR REDUCING FACIAL DISABILITY AND SYNKINESIS IN PATIENTS WITH BELLS PALSY

A COMPARATIVE STUDY

ABSTRACT

BACKGROUND OF THE STUDY: Peripheral facial palsy is the most frequent cranial neuropathy and can originate from various kinds of damage to the seventh cranial nerve .Bells palsy is the most common form of peripheral facial palsy in adults ,with an annual incidence of 20-30 cases .No gender,side,annual or seasonal differences have been noted .Recurrence rate is about 10%.The on set of Bells palsy is sudden.

METHODOLOGY: 30 Patients with acute idiopathic facial palsy were selected for this study on the selection crieteria, 15 in each group (males and females).

Subjections in Group A were treated with proprioceptive neuromuscular facilitation technique and subjects in Group B were treated with neuromuscular re-education technique. Both the group received intervention for 4 weeks. The baseline and post test score were measured by using SunnyBrook Facial Grading Scale.

RESULT : There is a significant difference in functional independence between patients receiving neuromuscular facilitation and neuromuscular re – education treatment.

CONCLUSION : Finally the study concluded that four weeks of training program with proprioceptive neuromuscular facilitation showed significant improvement when compared to the neuromuscular re-education technique.

KEYWORDS: **P**roprioceptive Neuromuscular Technique, Neuro Muscular Re-education technique, Bell's Palsy, Facial disability synkinesis.

Introduction

CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

Peripheral facial palsy is the most frequent cranial neuropathy and can originate from various kinds of damage to the seventh cranial nerve. Bell's palsy is unilateral weakness or paralysis of the face due to acute peripheral facial nerve dysfunction with no identifiable cause with some recovery of function within 6 month. It is an acute disorder of the facial nerve, the lower motor neuron lesion in origin may begin with symptoms of pain in the mastoid region and produce total or partial paralysis of movement of one side of the face. Bell's palsy is the most common form of peripheral facial palsy in adults with an annual incidence of 20-30cases per 1,00,000. Recurrence rate is about 10% that can present on the same or contralateral side. The onset of Bell's palsy is sudden and usually during a period of 1 to 7 days, reaching maximum weakness up to 1 to 3 weeks after onset.

Weakness of the facial musculature can result in difficulty in eating, drinking, speaking and conveying human emotions and communication signals. Secondary defects include disappearance of facial creases and nasolabial fold, the forehead unfurrows and the comer of the mouth droops. The eyelids will not close and the lower lid sags, on attempted closure, the eye rolls upward [Bell's phenomenon]. Tear production decreases. The food and saliva can pool in the affected side of the mouth and may spill out from the corner. Bell's palsy is commonly treated by various physical therapy strategies includes kinesiotherapy, massage therapy, cryotherapy and electrotherapy.Various neurofacilitatory approaches include proprioceptive neuromuscular facilitation [PNF], facial neuromuscular re – education.

Facial neuromuscular re – education [FNR]

Facial neuromuscular re – education is a process of relearning facial movement using specific and accurate feedback to:

- Enhance facial muscle activity in functional patterns of facial movement and expression

- Suppress abnormal muscle activity interfering with facial function.

Facial NMR is an evidence – based therapeutic practice utilizing specific movement training techniques to optimize facial muscular control.

Proprioceptive neuromuscular facilitation [PNF]

It was devised by Kabat et al. Proprioceptive neuromuscular facilitation a manual resistance technique that works by stimulating fundamental patterns of movement through stimulation of the proprioceptors result in either facilitation or inhibition.

Individually both techniques PNF and NMR have proven to be effective in patients with facial palsy.

Chandan Kumar. C 2015.

1.2 NEED FOR THE STUDY

Facial palsy and Bell's palsy is most disabling neural condition in terms of facial expression and communication .There are several functional therapies available to deal with it .Conventional therapy is most commonly used treatment for facial paralysis and many innovative approaches are emerging. Proprioceptive neuromuscular facilitation is one of the promising treatment in neural paralysis and having literatures .Supporting that it s more effective than conventional therapy. Individually both the treatment techniques have been proved to be effective

There is lack of study available which compares the two neuro facilitatory approaches: Proprioceptive neuromuscular facilitation [PNF] and neuromuscular re – education [NMR] in finding better protocol for patients with Bell's palsy. If the two techniques yield comparable outcomes and if one technique is superior to the other it should be the ideal choice of therapy.

1.3 AIMS AND OBJECTIVES

AIM OF STUDY

The aim of the study is to find out the effectiveness of facial neuromuscular re – education technique and proprioceptive neuromuscular facilitation technique on improving facial disability and synkinesis in rehabilitation of bell' s palsy.

1.4 OBJECTIVES OF THE STUDY

- To find out the effectiveness of Proprioceptive neuromuscular facilitation for reducing facial disability and synkinesis on Sunny Brook Facial Grading scale among subjects with Bell's palsy
- To find out the effectiveness of Prorioceptive neuromuscular facilitation in preventing facial disability, synkinesis on Facial Disability Index among subjects with Bell's palsy
- To find out the effectiveness of Facial neuromuscular re – education technique on Sunny Brook Facial Grading scale among subjects with Bell's palsy
- To find out the effectiveness of Facial neuromuscular re-education technique on Facial disability index among subjects with Bell's palsy .
- To compare the effectiveness of Proprioceptive neuromuscular facilitation and Facial neuromuscular re education on Sunny Brook Facial Grading scale among subjects with bells palsy .
- To compare the effectiveness of Proprioceptive neuromuscular facilitation and Neuro muscular re-education to improve facial function on Facial Disability Index among subjects with Bell's palsy.

1.5 HYPOTHESIS

Null hypothesis:

There would not have been any statistically significant difference on Sunny Brook Facial Grading scale after the application of intervention in both the groups among subjects with Bell's palsy .

There would not have been any statistically significant difference on Facial Disability Index after the application of intervention in both the groups among subjects Bell's palsy .

Alternate hypothesis:

There would have been statistically significant difference on Sunny Brook Facial Grading scale after the application of intervention in both the groups among subjects with Bell's palsy .

There would have been statistically significant difference on Facial Disability Index after application of intervention in both the groups among subjects with Bell's palsy .

1.6 OPERATIONAL DEFINITION

Bell's palsy

Bell's palsy is a type of facial paralysis that results in inability to control the facial muscles on the affected side .Symptoms can vary from mild to severe .They may include muscle twitching ,weakness or total loss of the ability to move one or rarelyboth sides of the face.

SUSAN O' SULLIVAN

Sunny brook facial grading scale [SFGS]

The Sunnybrook Facial Grading System (SB) is a well-established tool for assessing facial movement outcomes. The scores of the SFGS ranges from 0 [complete paralysis] to 100 [normal facial function].

JHON GAIL NEELY

Proprioceptive neuromuscular Facilitation [PNF]

A method of stretching muscles to maximize their flexibility that is often performed with a partner or trainer and that involves a series of contractions and relaxations with enforced stretching during the relaxation phase

MERRIAM WEBSTER

Neuromuscular re – education

Neuromuscular re-education is an energetic soft tissue technique ,which helps in restoring proper muscle function and movement so that the body heels and performs at its optimum level.

PRAMOD KERKAR

Review of Literature

CHAPTER II

REVIEW OF LITERATURE

2.1 REVIEWS RELATED TO BELL'S PALSY

- **TOMISLAV MESTROVIC 2015**

Biomedical Health science, Clinical microbiology

Bell's palsy is the most common cause of acute unilateral facial paralysis, according for approximately 60-70% of such case. The right side is generally affected more ,i.e 63% of the time, although bilateral facial paralysis can also occour the occourance rate is less than 1% when compared to unilateral Bell's palsy and it accounts for 23% 0f all conditions presenting with bilateral paralysis of the face The condition can also be recurrent in 44-14% of affected individuals.

The majority of large population studies reveal a yearly incidence of 15-30 cases per 100.000 persons .The annual incidence of Bell's palsy in the United states is approximately 23 cases per100.000 persons and in the United kingdom 20 persons per 100.000 persons. Certain countries show greater variability in the incidence of this condition.

- **ARUNABHA CHAKRAVARTI 2013**

Department of community medicine and paediatrics

The incidence rate was 7.3+-1.4/100.000children attending the hospital per year .The incidence was slightly higher among boys (7.6+_2.5/100.000)than girls (6.8+_1.2/100,000)

- **J.M.K.MURTHY 2011**

Department of neurology ,CARE HOSPITAL,HYDERABAD

The incidence of Bell's palsy is 20-30 cases for 100.000 and accounts for 60-70% of all cases of unilateral peripheral facial palsy.Either sex is affected equally and may occur at any age,the median age is 40years .The incidence is lowest under 10 years of

age and highest in people over the age of 70.The mean interval to first recurrence is reported at 9.8 years after the first episode.

- **S MONINI 2010**

Department of ,Mental health and sensory organs ,Italy

The annual incidence of Bell's palsy has been reported to to range between 11and 40 or 8 and 240 cases per 100.000 subjects. The cumulative incidence of Bell's palsy was found yo be 53.3/100.000/years. Among the risk factors age was found to infiuence on set of Bell's palsy,with an odd ratio of 2% for each one year.

- **ANTHONY G MARSON 2000**

Department ofNeurological science Faculty of medicine U.K

The incidence is around 23 per 100.000 people per year or about 1 in 60-70 people in a life time. It affects men and women more or less equally,with a peak incidence between the ages of 10 and 40.It occurs with equal frequency on the right and left sides of the face.

2.2 REVIEWS RELATED TO PROPRIOCEPTIVE NEUROMUSCULAR FECILITATION

- **RAJALAKSHMI GOPALAKRISHNAN 2018**

She did her study at Dr.M.G.R educational and research institute Velapanchavadi,Chennai.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 with in the facial canal or at the stylomastid foramen .It is usually unilateral, rarely bilateral and may occour repetitively .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 function ,which was assessd using SunnyBrookFacialGradingscale and facial disability index.

She Suggested that PNF for facial muscles can be used as an adjective in physiotherapy treatment for early and better facial function.

Her overall rate of patient recovery among those treated with VP (96.5%) was significantly better ($p < 0.05$) than the rate among those treated with PP (89.7%). The rate of patient recovery was also analyzed by classifying the initial severity of facial palsy. In cases of complete or severe palsy, the rates of patients treated with VP and PP who recovered were 95.7% (n = 92) and 86.6% (n = 82), respectively; the recovery rate for treatment with VP was significantly better than that with PP ($p < 0.05$).

Finally she concluded that,individuals in group A received electrical stimulation along with propioceptive neuromuscular facilitation shows better improvements.

- **KANWAL KHANZAD 2018:**

He conducted a study at conducted at the Department of Physiotherapy, Mayo Hospital, Lahore. Two equal Groups (A and B) consist of 26 patients each. Patients were employed Kabat rehabilitation technique in GroupA and with facial exercise in Group-B. Patients in both treatment groups were followed until 3 weeks and improvement in Sunnybrook facial grading scale (SFGS) and facial disability index (FDI) scale were recorded at the end of treatment. In this study, 52 patients were enrolled into the study. At the end of 3 weeks, more improvement was seen in SFGS in Group-A (81.58 + 11.321) versus Group-B (63.77 + 21.645). Similarly, the improvement in physical and social function on FDI in Group-A was more than Group-B (>0.05).

He conducted a randomized control study for 3 week. A number of 52 patients were included aged between 25 – 50 years male and female, having unilateral facial paralysis with nontraumatic onset. Patient were devided into two groups (26 each). Group A beated is kabat rehabilitation along with nerve stimulation.

He concluded that kabat rehabilitation along with nerve stimulation is more effective in treating Bell’s palsy as compared to facial exercise technique along with nerve stimulation.

- **VENCITA PRIYANKA ARANHA 2017:**

She did her study at Department of Pediatric and Neonatal Physiotherapy, Maharishi Markandeshwar Institute of Physiotherapy and Rehabilitation, Maharishi Markandeshwar University,Mullana,Ambala ,Hariyana.

According to his study, Bell's palsy in children is a rare case with no documented evidence regarding its rehabilitation management. He reported a case of a 7 – year – old boy diagnosed to have right indiopa0thic facial – nerve paralysis, who underwent 14 days of proprioceptive neuromuscular facilitation exercises along with facial massage.

He concluded that PNF along with facial exercise and massage might be an effective rehabilitaton approach in children with Bell's palsy.

- **TANPREET KAUR BAGGA 2015:**

He did study at MGM'S Institute of Physiotherapy,Auragabad Maharashtra.Purpose of the study was explained to all the subjects participated in study .

He did a clinical trial consisting of 40 participants 20 in each .In that Group A is treated with proprioceptive neuro muscular technique (PNF) with conventional PT treatment Group B receives neuromuscular re-education technique (NMR)with conventional PT for 6 days a week for 4 weeks .

The PNF technique that he used for managing facial paralysis are ;rhythmic initiation repeated stretch (repeated contraction),combination of isotonis percussion of tendon or margin &fasia of the muscle .Conventional treatment include interrupted galvanic stimulation with rectangular waveform with 100m,3sets and 30 contractions in each set.
v

He concluded that, those who received PNF with conventional therapy is more effective in Bell's palsy rehabilitation.

- **MISBAH GHOUS 2015:**

He did a study at Riphah college of rehabilitation &sciences at Islamabad on 2 patients divided in two groups & 10 each. PNF Group (n=10) and taping Group

(n=10). The diagnosed cases of acute and subacute non – traumatic Bell's palsy with age limit of 20 – 50 years.

He suggested that PNF Group using Kabat exercise with conventional treatment is better for minimizing the facial disability and synkinesis. In comparison to knesio tapping.

2.3 REVIEWS RELATED TO NEUROMUSCULAR RE – EDUCATION TECHNIQUE

- **KANWAL KHANZADA 2018:**

He concluded that a study of two equal groups (A and B) consist of 26 patients each. Patients were employed kabat rehabilitation technique in Group A and with facial exercise in Group B. In this study, 52 patients were enrolled in to the study. At the end of 3 weeks more than in Group A than in Group B.

He concluded that kabat technique is more effective as compared to facial exercise technique in improving physical function.

- **KUMAR C 2015: RELATED TO NMR**

His study was a randomized trial. Comisting 40 participants (males and females) 20 in each group with Bell's palsy of non – traumatic origin . Group A received proprioceptive neuromuscular facilitation (PNF)Group B received neuromuscular re – education with conventional PT for 6 days a week for 4 weeks.

According to SFGS and FDI disability measures, patients were classified into one of four treatment baned catogories (initiation, movement control relaxation). He suggests, alternating movements to relax the muscles.

He concluded that neuromuscular re – education with conventional PT is better in reducing synkinesis in Bell's palsy rehabilitation.

- **MANIKANDAN.N 2009:**

During his observational study of Bell's palsy in 1700 patients 64% will have regained normal function in 3 months without intervention. In longer term study found that 71% of people recovered normal function of the face, 13% had in significant symtoms and the rest 16% had permanently diminished function with contracture and synkinesis.

He suggested that, paralysis following Bell's palsy is neuromuscular retraining (NMR). NMR uses selective motor training to facilitate symmetrical movement and control undesired gross motor activity (synkinesis)

2.4 REVIEWS RELATED TO SUNNY BROOK FACIAL GRADING SCALE

- **JHON GAIL NEELY 2010:**

He did the study to constuct specific grading criteria and to test the intra – rater and inter – rater reliability.

For the reliability study ,30 subjects with facial paralysis were randomly presented to two native raters in four trials,trials using 1&2using the sunny brook system and 3&4 using specific criteria for the sunny brook system .The Sunny Brook system was reliable ,having correlation coefficient of 0.890 between raters,improved with the use of specific grading criteria to 927.

- **W L HU 2001:**

He did a study to evaluate the itra-rater and inter-rater reliability of the Sunny Brook Facial Grading system. Twenty-two patients with a wide spectrum of facial dysfunction recordedon video tapes were rated using the SFGS by eight observers independently in two different sitting separated by 3weeks .The order of patients was randomized for the second sitting .The intra –rater reliability coefficients for the eight raters ranged from .838 to .929.the inter –rater reliability for all eight raters at time 1 was .982 and for time 2 was . 970.

In this study score had excellent reliability in both face-face assessments.

2.5 REVIEWS RELATED TO FACIAL DISABILITY INDEX

- **CHIARA PAVESE 2014:**

He did a study on Facial Disability Index widely used for self assessment of functional impairement and quality of life in patients with facial palsy In this study questionnaire was translated and administered to 100 participants with facial palsy .FDI showed excellent test-retest reliability for every item .

The FDI is a 10 item questionnaire with 2 subscale scores 5 item s contribute to the physical function subcale ,5item contribute to the social function sub scale .each item is ratedon a 6-point scale, ranging from severe disability to absence of disability .

Findings indicate proper assessment and monitoring of people with facial palsy should include an evaluation of disability and quality of life .

- **GERD FABIAN VOLK 2014:**

In his study,a validated instrument to measure patient related outcome and quality of life in facial palsy.122 facial palsy patients with amedian duration of 4.7 months were included.

This study indicates ,physical scale is scored from -25(worst) to 100 (best) while the social function scores from 0(worst) to100(best).

Methodology

CHAPTER III

MATERIALS AND METHODOLOGY

3.1 STUDY DESIGN

A single blinded randomized experimental study design with pre and post-test evaluations was used.

3.2 STUDY POPULATION

Patient with acute peripheral facial nerve palsy were selected for this study .

3.3 SAMPLE SIZE

30 subjects

3.4 SAMPLING TECHNIQUE

Simple random sampling.

3.5STUDY SETTING

Department of Neurorehabilitation,Ashwin Hospital,Coimbatore.

3.6 STUDY DURATION

Study was conducted for a period of 6 months.

3.7 SELECTION CRITERIA

- **Inclusion criteria**
- Diagnosed Bell's palsy
- Non – traumatic onset
- Subjects with age 20-50 years
- Acute onset 1 to 3 weeks
- Both Male and Female
- Either Right or Left side
- **Exclusion criteria**
- Acute, unilateral, partial or complete paralysis of the face

- Upper motor neuron disease
- Neurotomesis
- Post – surgical cases have bareble pain
- Subjects who having other neurological disorder

3.7 MATERIALS

- Couch
- Pillow
- Chair
- Towel
- Electrical stimulator
- Electrodes
- Electrode gel
- Powder

3.8 PARAMETER

Sunny brook facial grading scale [SFGS]. Synkinesis assessment questionnaire [SAQ].

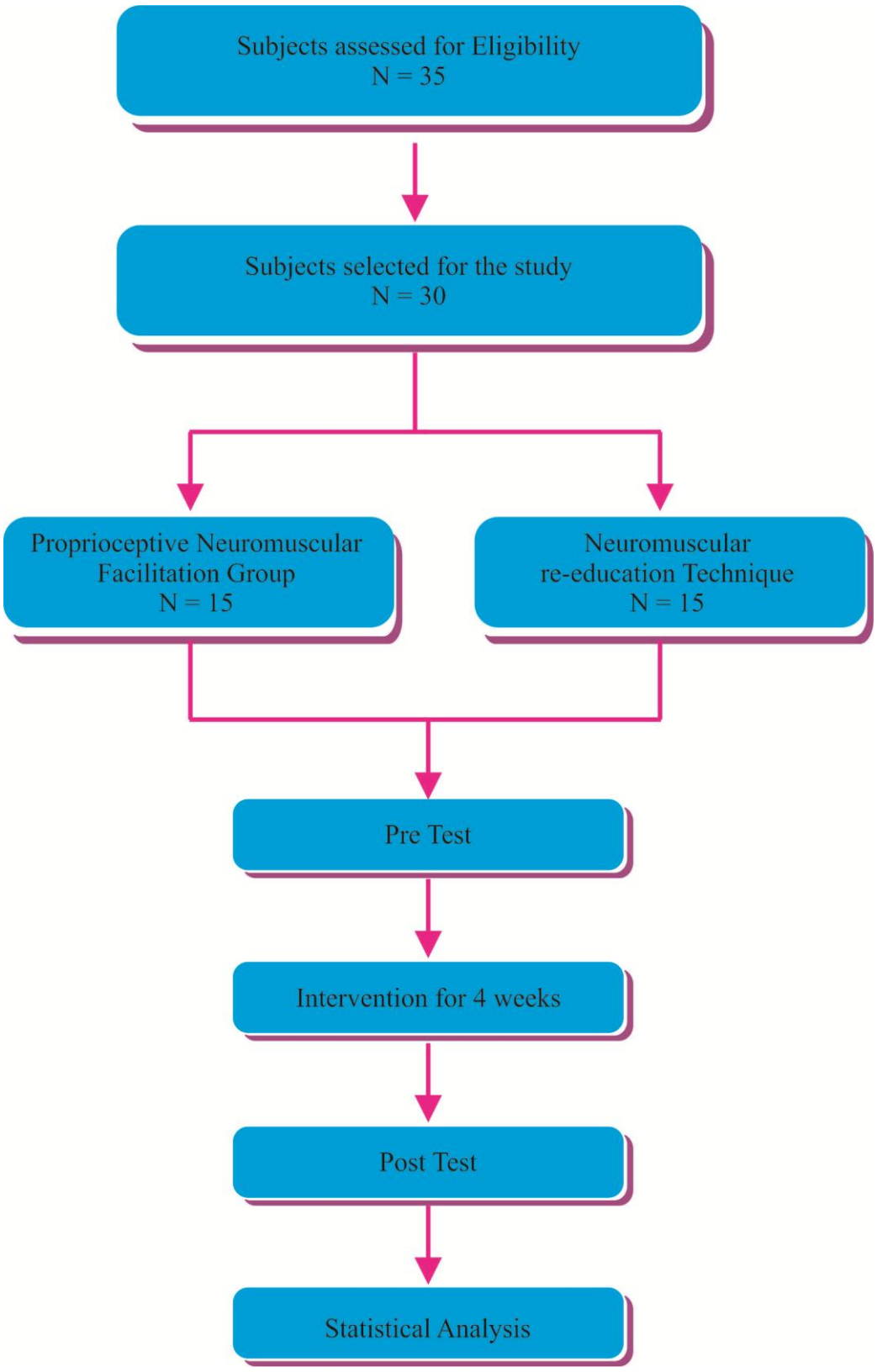
3.9 PROCEDURE

The subjects of both group were involved for assessment. After neurological examination SD curve [strength duration curve] was taken to assess the type of nerve injury and subjects who met inclusion criteria were assigned into two groups. 20 each.

Assessment of severity of paresis was measured using Sunny brook facial grading scale[pre and post treatment].

- Facial disability score was noted pre and post treatment .
- Synkinesis Assessment Questionnaire taken for pre and post treatment
- Intervention given for 6days a week ,for total 4 weeks .
- Treatment duration of one session approximately 45 minutes to 1 hour.

RESEARCH FLOW CHART



PNF TRAINING PROCEDURE :

1. Smile without opening the mouth ,use fingers to resist the movement for 5secs.
2. Purse the lips as in whistling ,apply resistance using fingers for 5 secs.
3. Lift the angle of mouth, apply resistance using the fingers for 5 secs.
4. Lower the lower lips ,apply resistance for 5secs.
5. Strain the chin with the mouth closed ,then apply resistance for 5 secs.
6. With the head upright ,open the mouth wide and apply resistance for 5 secs .
7. After 6 ex's ,release the resisted movement and stick out the tongue and hold for 5secs.
8. Stick the tongue upward and try to touch the tip to the nose and hold for 5secs.
9. Stick the tongue downward and try to touch the tip to the chin and hold for 5secs.
10. Stick the tongue to the right and then to the left .When sticking the tongue to the right [left] lower the left [right] shoulder and hold for 5 sec.

3.10 TREATMENT TECHNIQUES

PROPRIOCEPTIVE NEROMUSCULAR TECHNIQUE [PNF] AND CONVENTIONAL TREATMENT:

The PNF techniques, that managing facial paralysis conditions are: Rhythmic initiation, repeated stretch [repeated contractions], combination of isotonic and percussionof of tendons or margin and fascia of the muscle. PNF technique given to all the facial muscles one by one and irradiation of weaker muscles muscle.

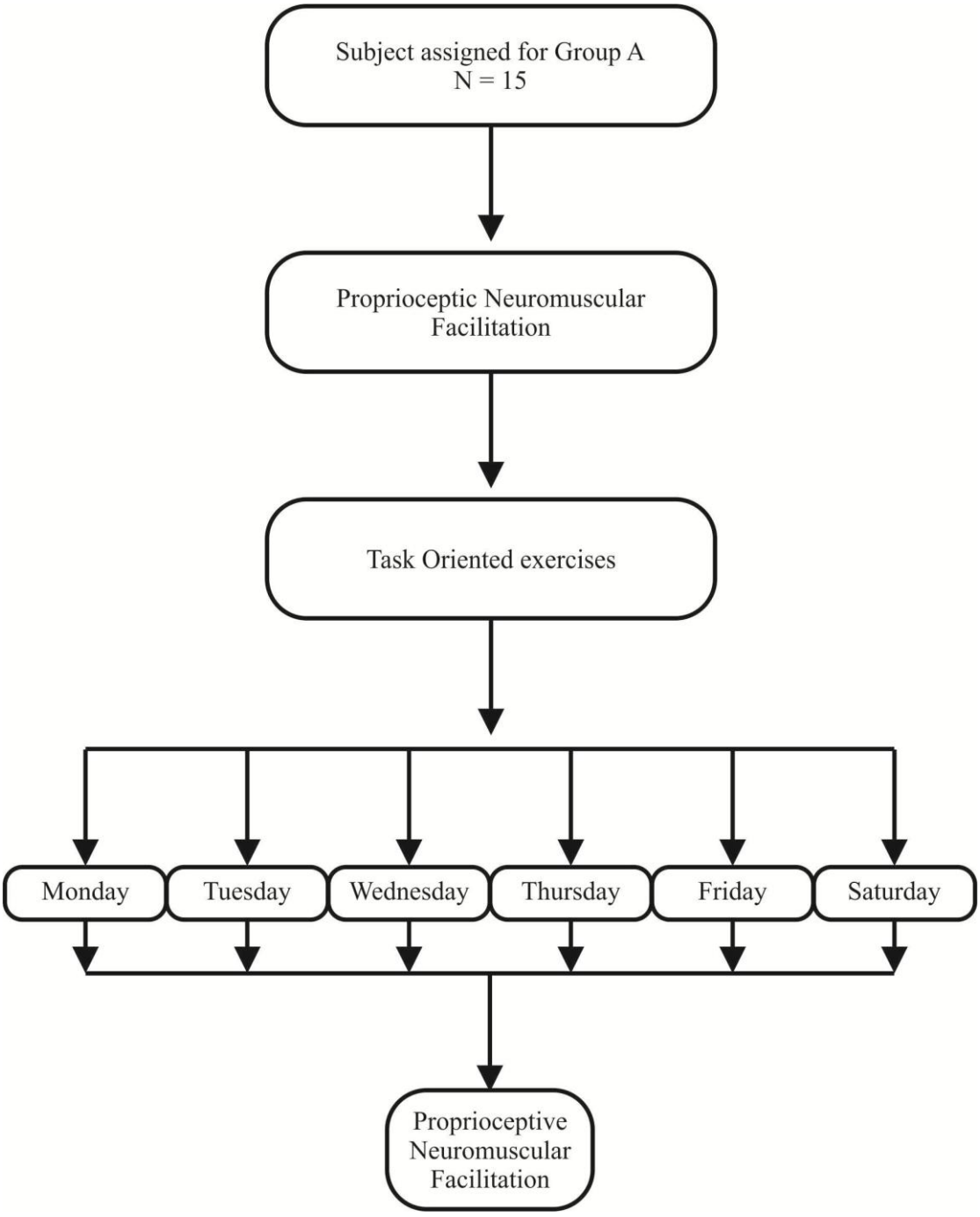
Coventional treatment includes:

Interrupted galvanic stimulation with rectangular wave form with 100ms, 3 sets and 30 contractions in each set.

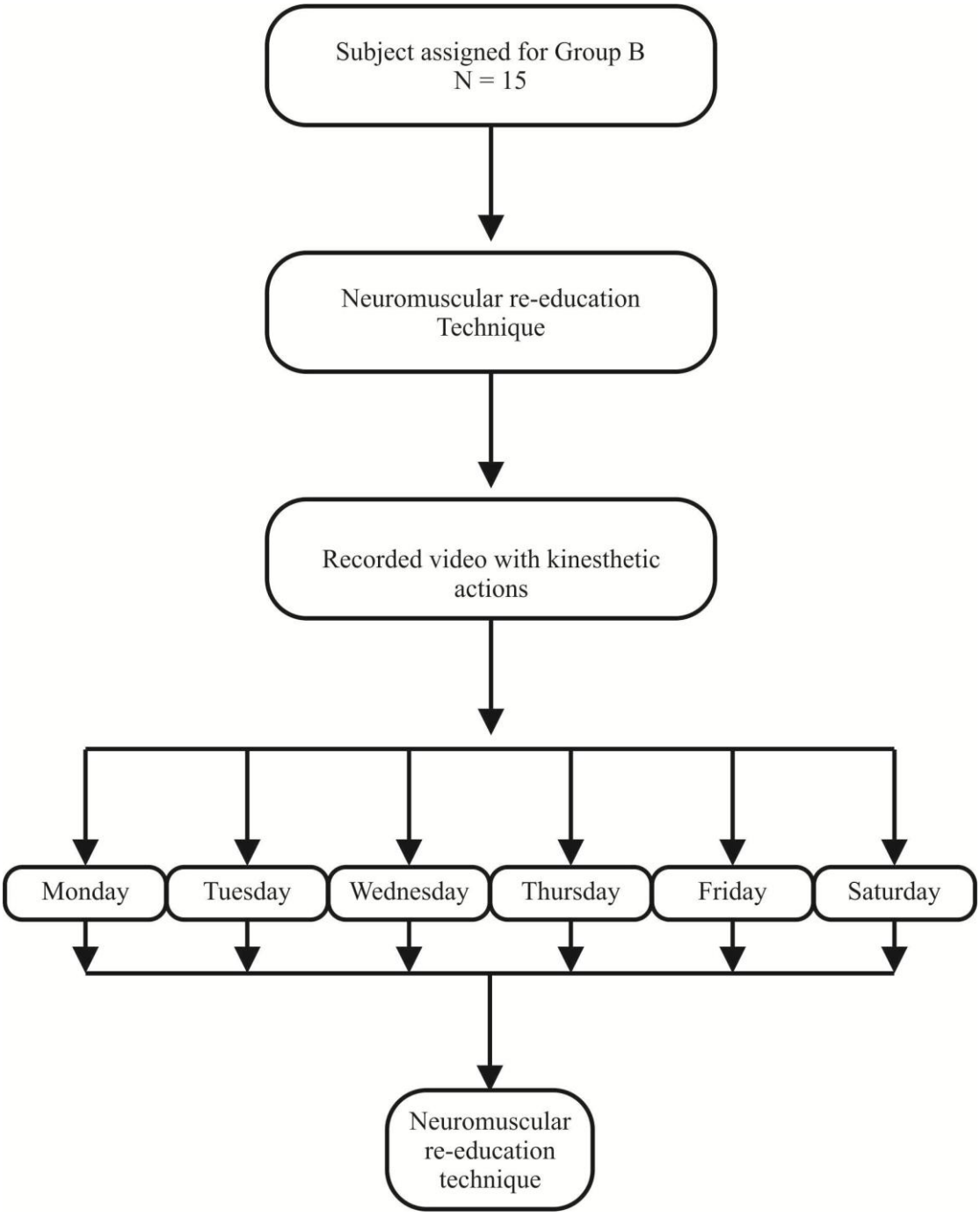
Manual facial massage:

Effleurage, finger to thumb needing, wringing, hacking, tapping and strocking.

FLOW CHART SHOWING THE TREATMENT PROGRAM ADOPTED FOR GROUP A



FLOW CHART SHOWING THE TREATMENT PROGRAM ADOPTED FOR GROUP B



NEUROMUSCULAR RE – EDUCATION TECHNIQUE [NMR]

Identified by using Sunny brook facial grading scale [SFGS] impairment and Facial disability index [FDI] measures, patient were classified into one or four treatment based categories.[initiation, facilitation, movement control and relaxation].The primary treatment for problems of facial twitches and spasms are relaxation exercises, the standard relaxation exercises, is small rhythmic alternating movements to relax the muscles.

Conventional treatment includes:

Interrupted galvanic stimulation with rectangular form with100ms, 3 sets and 30 contraction in each set. Effleurage, finger to thumb needing, wringing, hacking, tapping and strocking.

PHOTOGRAPHIC PRESENTATION

Data Analysis and Result

CHAPTER IV

DATA ANALYSIS AND RESULTS

This study comprised of two groups, Group A subjects were treated with proprioceptive neuromuscular facilitation and subjects in group B were treated with neuromuscular education technique.

4.1 STATISTICAL TOOLS

The statistical tools used in the study are paired t-test and unpaired t-test .The Paired 't'test was used for within group analysis. The unpaired 't'test was used for inter group analysis .

PAIRED 't'-TEST

The paired t-test was used to find out the statistical significance between pre and post t-test values of Sunny Brook Facial Grading scale and Facial Disabilty Index before and after treatment for Group A and Group B.

FORMULA FOR PAIRED 't'- TEST,

$$t = \frac{\bar{d}\sqrt{n}}{S}$$

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

=difference between the pre test Vs post test values

d=mean difference

n=number of observation

s=standard deviation

UNPAIRED ‘t’-TEST

The unpaired t-test was used to compare the statistically significance difference of Sunny Brook Facial Grading scale and facial Disability Index before and after treatment for Group A and Group B .

FORMULA FOR UNPAIRED t-TEST,

Statistic analysis is done by using independent ‘t’ test

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S}\sqrt{\frac{n_1 n_2}{(n_2 + n_2)}}$$

$$S = \sqrt{\frac{\sum(X_1 - \overline{X}_2)^2 + \sum(X_2 - \overline{X}_2)^2}{n_1 + n_2 - 2}}$$

= mean value of group I

=mean value of group II

=number of observation in group A

=number of observation in group B

=combine standard deviation group

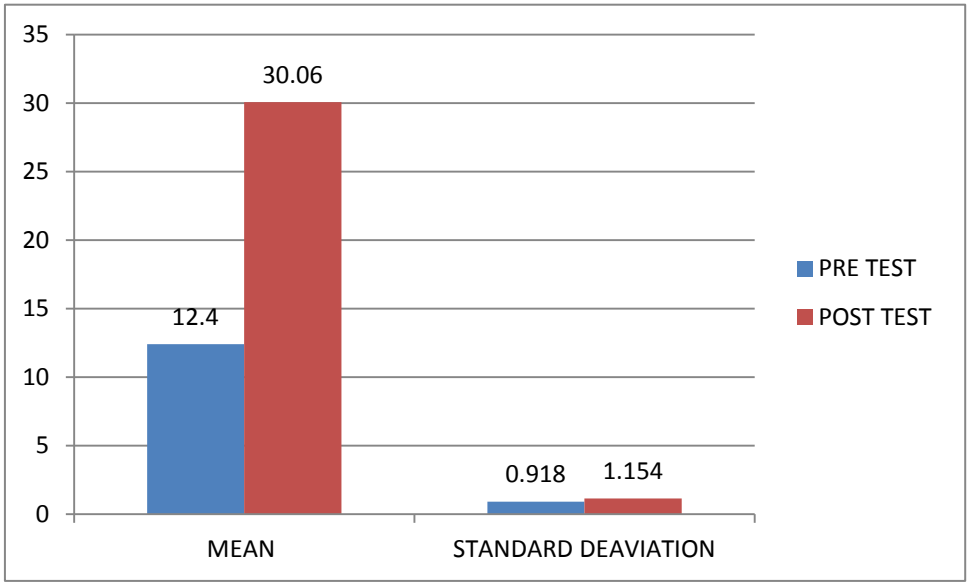
4.2 **Demographical Data:**

	Gender		**Age (years)**	**Onset Duration**	**Side affected**	
	Male	**Female**			**Left**	**Right**
Group A (n=15)	10	5	37	6.9	9	6
Group B (n=15)	11	4	40	7.5	10	5

4.3 DESCRIPTIVE ANALYSIS OF GROUP A :

- **SUNNY BROOK FACIAL GRADING SCALE :**

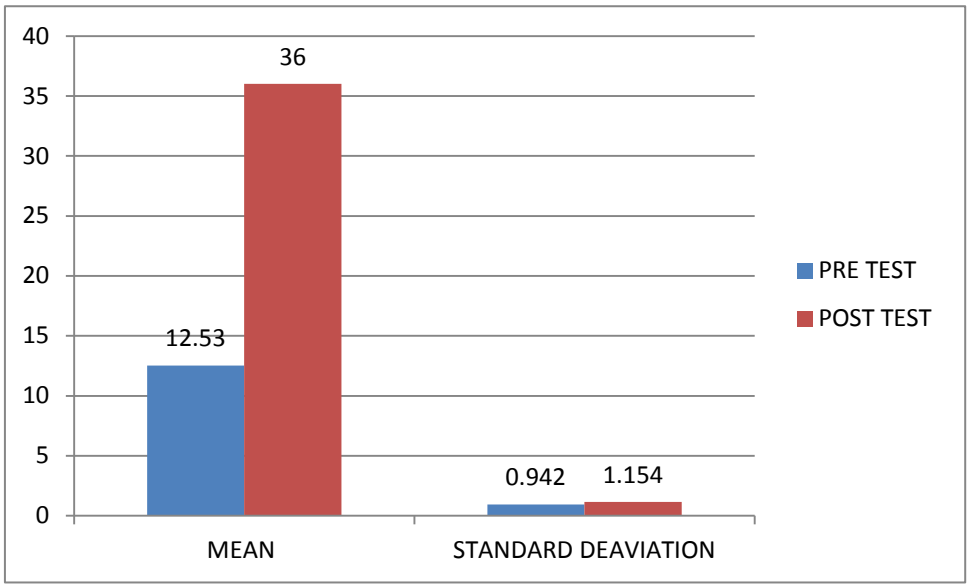
TEST	MEAN	STANDARD DEAVIATION	T VALUE	P VALUE
PRE TEST	12.4	0.918	0.139	>0.05
POST TEST	30.06	1.154		



4.4 DESCRIPTIVE ANALYSIS OF GROUP B :

- **SUNNY BROOK FACIAL GRADING SCALE :**

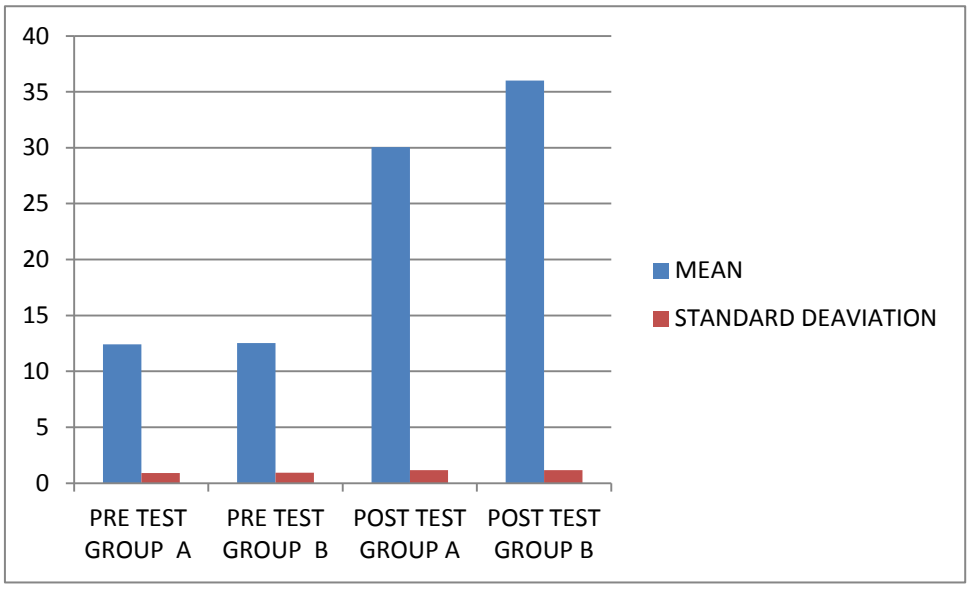
TEST	MEAN	STANDARD DEAVIATION	T VALUE	P VALUE
PRE TEST	12.53	0.942	2.701	>0.05
POST TEST	36	1.154		



4.5 DESCRIPTIVE ANALYSIS OF GROUP A AND B :

- **SUNNY BROOK FACIAL GRADING SCALE:**

TEST	MEAN	STANDARD DEAVIATION	T VALUE	P VALUE
PRE TEST GROUP A	12.4	0.912	0.139	>0.05
PRE TEST GROUP B	12.53	0.942		
POST TEST GROUP A	30.06	1.154	2.701	<0.05
POST TEST GROUP B	36	1.159		



RESULTS

Effectiveness of Group A (Proprioceptive neuromuscular technique) is elicited by comparing the pre test and post test values of group B using paired ‘t’ test, the calculated value is 13.96, where as the critical value is 2.145 since the calculated value is greater value is critical value, there exist a significant difference between the pre test and post test values of group B. When comparing the mean values of both, the post test mean value 30.06 is greater than the pre test mean value 12.4 which confirms that there is a significant improvement in functional activities.

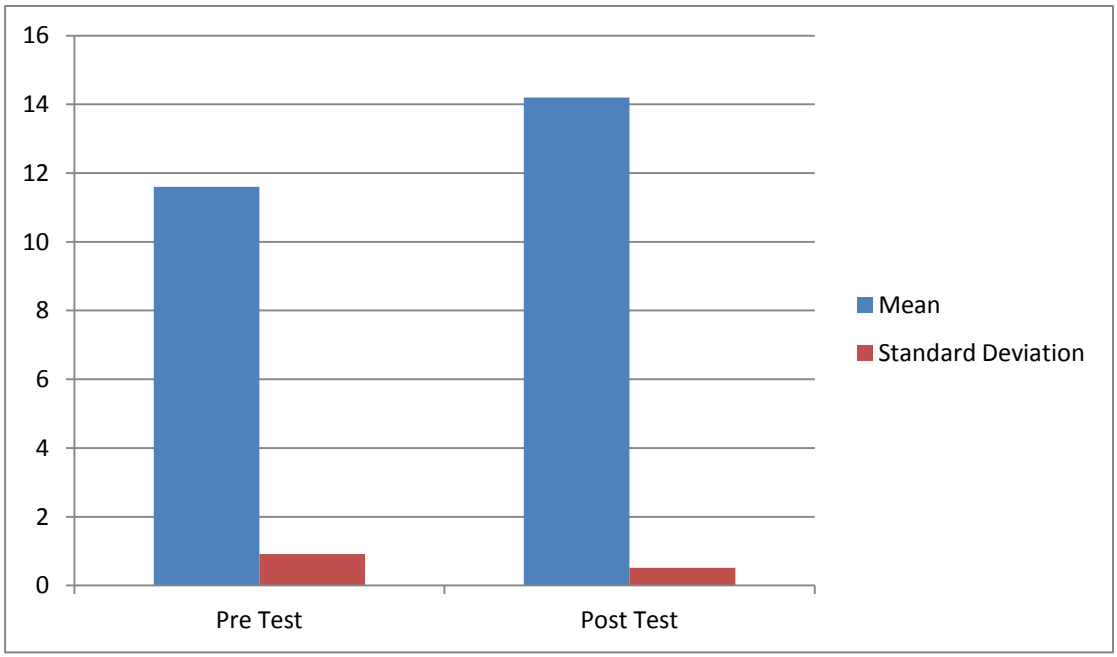
Effectiveness of Group B (neuromuscular re – education technique) is elicited by comparing the pre test and post test values of group A using paired ‘t’ test, the calculated value is 13.96, where as the critical value is 2.145. Since the calculated value is greater than the critical value, there exists a significant difference between the pre test and post test values of group A. When comparing the mean values of both, the post test mean value 36 is greater than the pre test mean value 12.53, which confirms that there is a significant improvement in functional activities.

While comparing the post test values of group A and group B using independent ‘t’ test, the calculated value is 2.701, the critical value is 2.048. Since the alternate hypothesis is accepted, which shows there exist a significant difference between the post test values of two groups.

When comparing the mean values of both, the post test mean value of group A 30.06 is lesser than the post test mean value of group B 36 which confirms that group A shows a significant improvement in functional activities than group B.

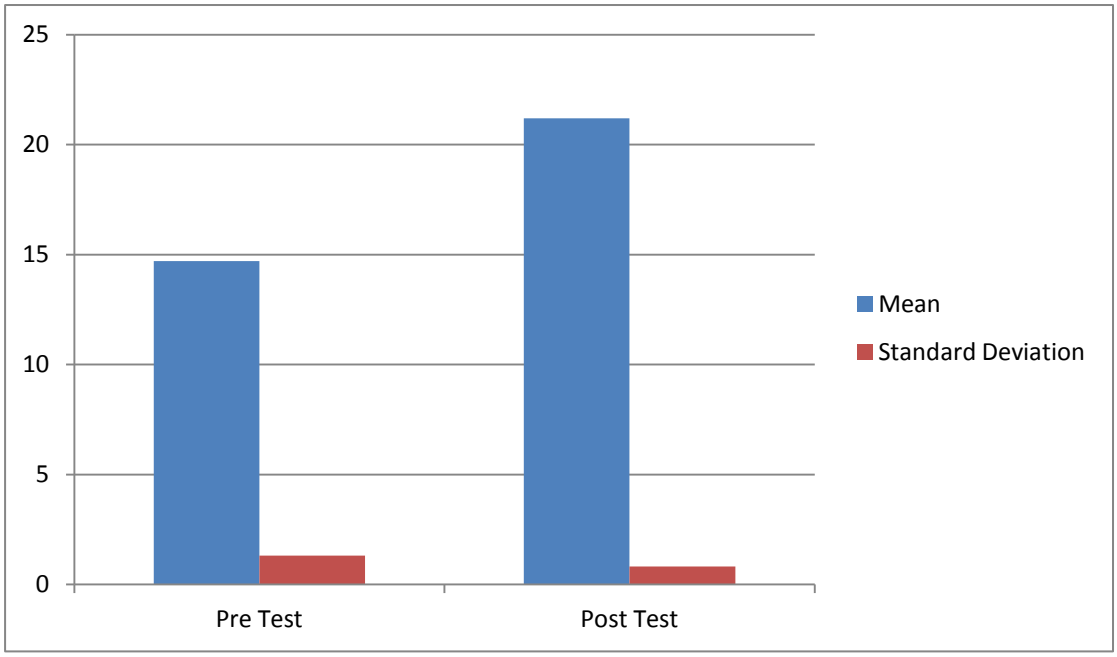
❖ **FACIAL DISABILITY INDEX ADOPTED FOR GROUP A**

TEST	MEAN	STANDARD DEAVIATION	T VALUE	P VALUE
PRE TEST	11.600	0.918	1.039	>0.05
POST TEST	14.200	0.516		



❖ **FACIAL DISABILITY INDEX ADOPTED FOR GROUP B**

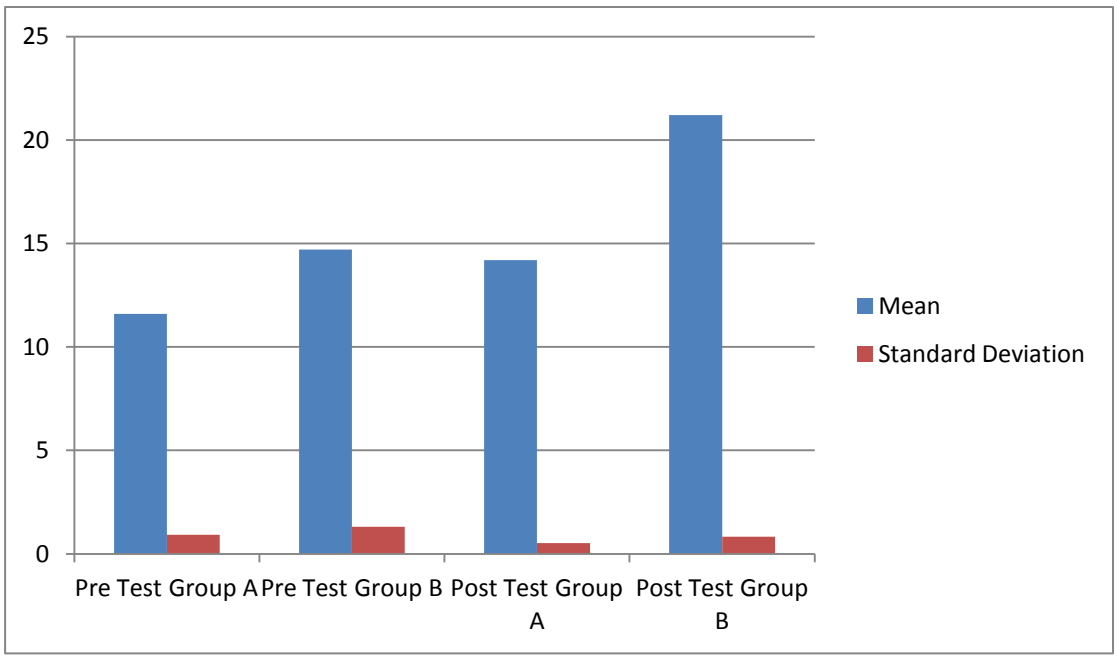
TEST	MEAN	STANDARD DEAVIATION	T VALUE	P VALUE
PRE TEST	**14.700**	**1.316**	**1.372**	**>0.05**
POST TEST	**21.200**	**0.823**		



RESULTS : The pre-test values of both group A and group B were calculated the pre mean values for both groups were 14.200 and 21.200. The post test mean value of both groups were 11.600 and 14.700. The T values of both groups was 1.372 and 1.039, when comparing the mean value of both, the post test mean value of group B 21,200, which confirms that group A shows a significant improvement in functional activities than group B.

FACIAL DISABILITY INDEX BETWEEN GROUP A AND GROUP B

TEST	MEAN	STANDARD DEAVIATION	T VALUE	P VALUE
PRE TEST GROUP A	11.600	0.918	1.039	>0.05
PRE TEST GROUP B	14.700	1.316		
POST TEST GROUP A	14.200	0.516	1.372	<0.05
POST TEST GROUP B	21.200	0.823		



Discussion

CHAPTER V

DISCUSSION

S.MONINI; in her study subjects affected by peripheral facial nerve palsy ,distributed by age, were randomly assigned to medical treatment ,either alone or Kabat physical rehabilitation .The result show that ,when treated only by medical therapy ,the HB V subjects showed no significant age difference in relation to the achievement of a HB Grade III (100% in the over 65,80% in the under 65),whilst, in the HB IV subjects, the younger population showed a better recovery with 89% of a good recovery.

She concluded that kabat rehabilitation is more effective in case of severe Bell's palsy. Also include this type of physical rehabilitation in patients with Bell's palsy in most severe cases may carry the risk of disfiguring facial sequelae.

DAVID MC Cormicks's landmark study published in lancet in 1972, reactivation of latent herpes simplex virus in the seventh nerve ganglion.

In one of the more extensive case series analyses, Wilbrand and Blumhagen describe a population of 230 individuals with idiopathic peripheral seventh nerve palsy, 6% of which had family history.

Patients with some preserved motor function have good recovery, but those with complete paralysis may have long term residual deficits.

The purpose of this study was twofold: to compare the two neurofacilitory approaches, proprioceptive neuromuscular facilitation [PNF] and neuromuscular re – education on improving facial disability and synkinesis in rehabilitation of bell's palsy.

The result of this study reveals the effectiveness of PNF along with electrical stimulation in improving facial symmetry and facial muscle function in lower motor neuron bell's palsy.

Both the groups shown improvement in facial muscle physical function and facial symmetry was assessed using sunny brook facial grading system and facial disability index.

The result of this study shows more effectiveness of PNF and more beneficial to patients with bell's palsy than NMR.

According to Rajalakshmi Gopalakrishnan , 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 Groups A and Group B had shown improvements in facial muscle physical function .Better improvements were seen in facial symmetry and facial muscle function in GroupA who received electrical stimulation along with proprioceptive neuromuscular facilitation . Proprioceptive Neuromuscular facilitation is a philosophy and a method of treatment was started by Dr.Herman Kabat in 1940s .PNF having to do with any of the sensory reception that give information concerning movement and position of the body

The result of the study suggests that both PNF and NMR shows significant improvement .PNF with conventional PT is more effective in imoroving facial function where as NMR with conventional PT is better in reducing synkinesis in Bell's pasly.

Summary and Conclusion

CHAPTER VI

SUMMARY AND CONCLUSION

6.1 SUMMARY

In an effort to find out the efficacy of Proprioceptive Neuromuscular facilitation and Neuromuscular re-education in improving functional activities in patients with bell's palsy, 30 subjects were selected using purposive sampling technique and assigned into two groups with 15 subjects each.

Group A was treated with proprioceptive neuromuscular technique with conventional PT treatment and Group B was treated with neuromuscular re – education technique combined with conventional PT treatment for 6 days a week for 4 weeks.

Pre – test and post –test scores are noted and analysis was done using independent 't' test.

The intragroup analysis was done and results were analysis using paired 't' test.

6.2 CONCLUSION

It is concluded that both PNF group and NMR showed significant results and improvement in facial symmetry. PNF with conventional PT is more effective in improving facial function and reducing facial disability. PNF with conventional therapy is more effective than NMR with conventional therapy in patients with bell's palsy.

Limitations and Suggestions

CHAPTER VII

LIMITATIONS AND SUGGESTIONS

7.1 LIMITATIONS

- Small number of subjects were selected for this study
- Short intervention period of 4 weeks
- No follow up was taken whether improvements in facial symmetry was maintained even after cessation of treatment.
- The study was a short term study

7.2 SUGGESTIONS

- This study has been done with small sample size so further study can be done with large samples .
- This study was very short term and to make it more valid long term is necessary.
- The same study can be conducted in patients with other neurological disorder such as hemiplegic patients, head injury.
- Further studies can be done with other tools.
- Variation in climate, diet, personal habit, side of involvement, gender, age could not be controlled.
- Either right or left side involvement is considered due to lack of subjects, the variation in dominant side involvement could not be controlled.

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CHAPTER VIII
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Annexure

CHAPTER XI

ANNEXURE I

CASE ASSESSMENT PROFORMA

Case no :

Name :

Sex :

Address :

Date of admission :

Date of evaluation :

History :

On observation :

On examination :

Treatment :

Measurement tool : Sunny Brook Facial Grading scale

S.NO.	PRE TEST	POST TEST

Signature of physical therapy student

ANNEXURE II

PATIENT CONSENT FORM
EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION AND NEUROMUSCULAR RE – EDUCATION OF REDUCING FACIAL DISABILITY AND SYNKINESIS IN PATIENTS WITH BELL'S PALSY COMPARATIVE STUDY

INVESTIGATOR: _ _ _ _ _ _ _ _ _ _ _ _ _ _

PROPOSE OF THE STUDY:

I _____ have been informed that this study will work towards achieving on the functional activities for me and other patients.

PROCEDURE:

Each term of the study protocol has been explained to me in detail I understand that during the procedure, I will be receiving the treatment for one time a day. I understand that I will have to take this treatment for 4 weeks. I understand that this will be done under investigator, _____ _____ supervision. I am aware also that I have to follow therapist's instruction as has been told to me.

CONFIDENTIALITY:

I _____ understand that medical information provided by this study will be confidential. If the data used for publication in the medical literature or for teaching purposes, no names will be used and other literature such as audio or vedio tapes will be used only with permission.

RISK AND DISCOMFERT:

I understand that there is no potential risks associated with this procedure, and understand that investigator will accompany me during this procedure. There are no known hazards associated with this procedure.

PHOTOGRAPHY CONSENT :

Mr. PRASANTH / Dr.M.PRADEEPA have been explained to me that photography are required in order to illustrate various aspects of the study for the thesis and at the presentation or conference by giving my consent I _____ authorize **Mr. PRASANTH/Dr.M.PRADEEPA** to use any of the photography taken of me in printed format, in slides for presentation.

REQUEST FOR MORE INFORMATION:

I _____ understand that I ask any questions about the study at any time **Mr. PRASANTH / Dr.M.PRADEEPA** are available to answer my question. Copy of this concern form will be given to me keep for my careful readings.

REFUSAL OR WITHDRAWAL OF PARTICIPATION:

I _____ understand that my participation is voluntary and I may withdraw consent and discontinue participation at any time after he has explained the reasons for doing so.

INJURY STATEMENT :

I understand that the treatment procedure, under the guidance of my therapist, is likely to cause any / no injury. In such case medical attention will be provide, but no compensation will be provided. I understand my agreement to participate in this study and I am not waiving any of my legal rights.

I _____ confirm that **Mr. PRASANTH** / **Dr.M. PRADEEPA** have explained me the purpose of the study, the study procedure and possible risk that I may experience. I have read and I have understand this concern to participate as a subject in this study.

_____ _____

SUBJECT **DATE**

_____ _____

WITNESS TO SIGNATURE **DATE**

I have explained **(Mr. PRASANTH / Dr.M.PRADEEPA)** the purpose of the research, the procedure required and the possible risks and benefits, to the best of my ability.

_____ _____

INVESTIGATOR **DATE**

1. Mr. PRASANTH

2. Dr. M. PRADEEPA

ANNEXURE III

MASTER CHART

TABLE - 1

PRE TEST AND POST TEST VALUES OF GROUP A AND GROUP B USING SUNNY BROOK FACIAL GRADING SCALE.

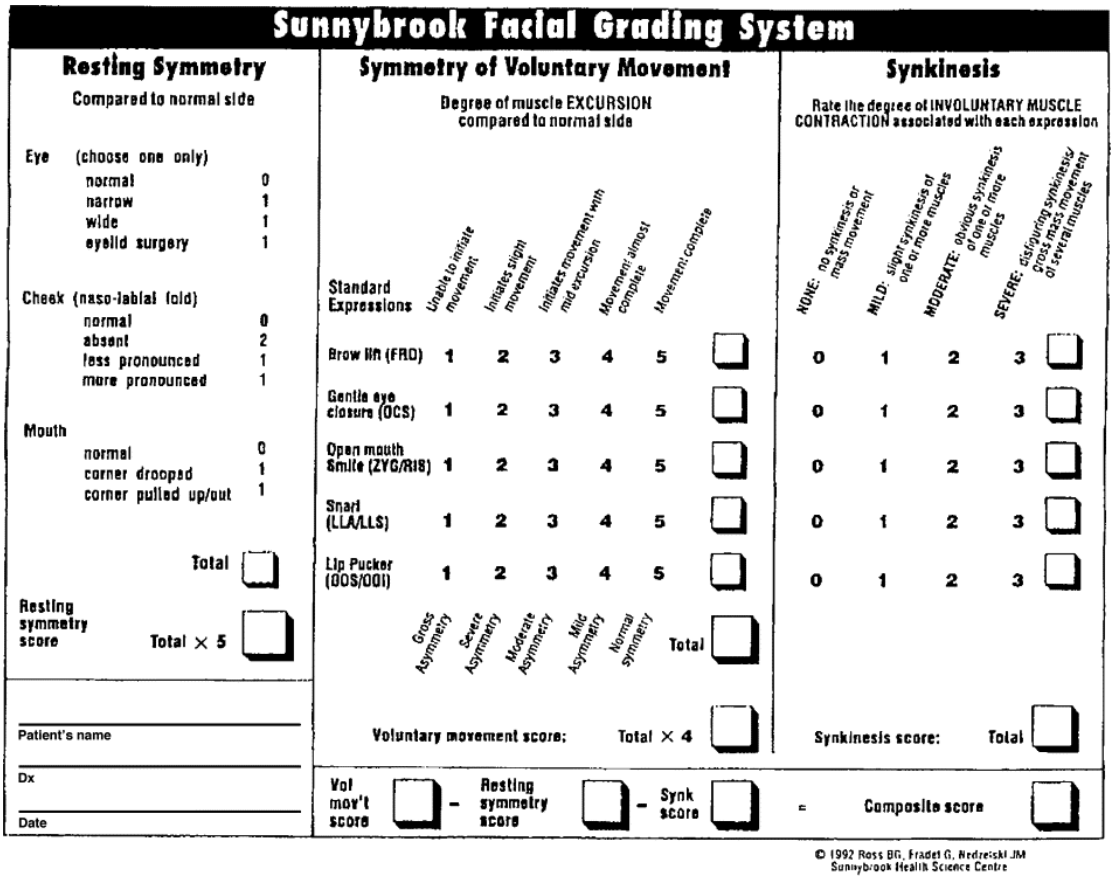
GROUP A			GROUP B		
S.NO.	**PRE TEST**	**POST TEST**	**S.NO.**	**PRE TEST**	**POST TEST**
1	15	37	1	11	32
2	10	24	2	15	42
3	11	26	3	10	31
4	15	38	4	17	50
5	13	29	5	12	33
6	17	40	6	13	34
7	12	28	7	15	42
8	10	25	8	9	28
9	16	39	9	11	32
10	14	36	10	13	38
11	12	28	11	16	45
12	13	33	12	13	36
13	9	22	13	9	28
14	10	24	14	10	30
15	9	22	15	14	39

TABLE - 1I

PRE TEST AND POST TEST VALUES OF GROUP A AND GROUP B USING FACIAL DISABILITY INDEX.

GROUP A			GROUP B		
S.NO.	**PRE TEST**	**POST TEST**	**S.NO.**	**PRE TEST**	**POST TEST**
1	15	12	1	11	8
2	14	13	2	15	7
3	12	12	3	12	9
4	13	12	4	13	8
5	14	13	5	14	6
6	12	11	6	12	10
7	15	13	7	12	9
8	11	12	8	11	9
9	13	13	9	13	8
10	15	13	10	11	7
11	11	12	11	12	6
12	14	11	12	14	8
13	16	12	13	12	9
14	12	13	14	13	10
15	13	14	15	13	7

SUNNYBROOK FACIAL GRADING SCALE



Sunnybrook Facial Grading System

Resting Symmetry

Compared to normal side

Eye (choose one only)
- normal 0
- narrow 1
- wide 1
- eyelid surgery 1

Cheek (naso-labial fold)
- normal 0
- absent 2
- less pronounced 1
- more pronounced 1

Mouth
- normal 0
- corner drooped 1
- corner pulled up/out 1

Total ☐

Resting symmetry score: Total × 5 ☐

Patient's name

Dx

Date

Symmetry of Voluntary Movement

Degree of muscle EXCURSION compared to normal side

Standard Expressions	Unable to initiate movement	Initiates slight movement	Initiates movement with mid excursion	Movement almost complete	Movement complete	
Brow lift (FRO)	1	2	3	4	5	☐
Gentle eye closure (OCS)	1	2	3	4	5	☐
Open mouth Smile (ZYG/RIS)	1	2	3	4	5	☐
Snarl (LLA/LLS)	1	2	3	4	5	☐
Lip Pucker (OOS/OOI)	1	2	3	4	5	☐

Gross Asymmetry | Severe Asymmetry | Moderate Asymmetry | Mild Asymmetry | Normal symmetry | Total ☐

Voluntary movement score: Total × 4 ☐

Synkinesis

Rate the degree of INVOLUNTARY MUSCLE CONTRACTION associated with each expression

	NONE: no synkinesis or mass movement	MILD: slight synkinesis of one or more muscles	MODERATE: obvious synkinesis of one or more muscles	SEVERE: disfiguring synkinesis/ gross mass movement of several muscles	
Brow lift (FRO)	0	1	2	3	☐
Gentle eye closure (OCS)	0	1	2	3	☐
Open mouth Smile (ZYG/RIS)	0	1	2	3	☐
Snarl (LLA/LLS)	0	1	2	3	☐
Lip Pucker (OOS/OOI)	0	1	2	3	☐

Synkinesis score: Total ☐

Vol mov't score ☐ − Resting symmetry score ☐ − Synk score ☐ = Composite score ☐

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Sunnybrook Health Science Centre

Facial Disability Index

Please circle the most appropriate response to the following questions related to problems associated with the function of your facial muscles. For each question, consider your function **during the past month**:

Physical Function

1. How much difficulty did you have did you have keeping food in your mouth, moving food around in your mouth, or getting food stuck in your cheek while eating?

Usually did with:	Usually did not eat because:
5 - no difficulty	1 - of health
4 - a little difficulty	0 - of other reasons
3 - some difficulty	
2 – much difficulty	

2. How much difficulty did you have drinking from a cup?

Usually did with:	Usually did not drink because:
5 - no difficulty	1 - of health
4 - a little difficulty	0 - of other reasons
3 - some difficulty	
2 – much difficulty	

3. How much difficulty did you have saying specific sounds while speaking?

Usually did with:	Usually did not speak because:
5 - no difficulty	1 - of health
4 - a little difficulty	0 - of other reasons
3 - some difficulty	
2 – much difficulty, slurring of speech	

4. How much difficulty did you have with your eye tearing excessively or becoming dry?

Usually did with:	Usually did not tearing because:
5 - no difficulty	1 - of health
4 - a little difficulty	0 - of other reasons
3 - some difficulty	
2 – much difficulty	

5. How much difficulty did you have with brushing your teeth or rinsing your mouth?

Usually did with:	Usually did not brusing or rinsing because:
5 - no difficulty	1 - of health
4 - a little difficulty	0 - of other reasons
3 - some difficulty	
2 – much difficulty	

Social Function

6. How much of the time have you felt calm and peaceful?

6 – all of the time	5 – most of the time
4 – a good bit of the time	3 – some of the time
2 – a little bit of the time	1 – none of the time

7. How much of the time did you isolate yourself from people around you?

6 – all of the time	5 – most of the time
4 – a good bit of the time	3 – some of the time
2 – a little bit of the time	1 – none of the time

8. How much of the time did you get irritable toward those around you?

6 – all of the time	5 – most of the time
4 – a good bit of the time	3 – some of the time
2 – a little bit of the time	1 – none of the time

9. How often did you wake up early or wake up several times during your nighttime sleep?

6 – all of the time	5 – most of the time
4 – a good bit of the time	3 – some of the time
2 – a little bit of the time	1 – none of the time

10. How often has your facial function kept you from going out to eat, shop, or participate in family or social activities?

6 – all of the time	5 – most of the time
4 – a good bit of the time	3 – some of the time
2 – a little bit of the time	1 – none of the time

DO NOT COMPLETE THIS SECTION – TO BE COMPLETED BY YOUR THERAPIST

Scoring:

Physical Function

$$\frac{\text{Total Score (questions 1-5)} - N}{N} \times \frac{110}{4}$$

Social Function

$$\frac{\text{Total Score (questions 6-10)}}{N} \times \frac{100}{5}$$

N = Number of questions answered