Original Research Paper

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Occupational Therapy

STUDY ON EFFECTIVENESS OF MIRROR THERAPY ALONG WITH CONVENTIONAL THERAPY COMPARED TO CONVENTIONAL THERAPY ALONE ON FACIAL NEURALGIA PAIN

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ABSTRACT

Background - Facial pain is described as " world's worst pain" by the patients suffering from facial neuralgia. Persistent facial pain affects many different aspects of people's lives. It can make everyday life difficult to manage, affect people's mood and cause unhappiness and depression. Persistent facial pain affects many different aspects of people's lives. It can make everyday life difficult to manage, affect people's mood and cause unhappiness and depression.

Objective : To reduce Facial Neuralgia Pain by using Mirror Therapy along with Conventional Therapy.

Study design: Prospective comparative study.

Methods : The study was conducted on total 30 patients with 15 in each group. They were allocated in two groups by convenient sampling method. conventional group (group A) received conventional Occupational therapy alone which included TENS, moist heat for trapezius, neck isometric exercises and relaxation techniques including deep breathing and visual imagery and experimental group (group B) received mirror therapy along with conventional Occupational therapy for 8 weeks. Each session lasted for 40-45 min, 5 times a week. Evaluations were carried out for both groups at week 1, week 4, week 8 by using McGill Pain Questionnaire.

Result – Results show the comparison of Control and experimental group on McGill Pain Questionnaire. There was highly significant reduction in mean pain score in experimental group as compared to conventional group (7.53 vs 17.53,$p<0.0001$,HS***) at 4th week . Whereas Independent t-test showed that there was significant reduction in pain score in experimental group as compared the conventional group (14.2 vs 31.2, $p<0.0001$,HS***) at 8th week.

Conclusion : study concluded that The mirror therapy along with conventional occupational therapy was effective to reduce facial neuralgia pain than conventional occupational therapy alone. So mirror therapy is effective and should be used as an adjunctive therapy along with conventional treatment to reduce facial neuralgia pain.

KEYWORDS : Mirror Therapy, Facial Neuralgia

INTRODUCTION:

Facial neuralgia is a stabbing, burning, and often quite severe facial pain that occur due to a damaged nerve which includes trigeminal neuralgia, glassopharyngeal neuralgia, anterior ethmoidal syndrome, burning mouth syndrome, atypical odontalgia and atypical facial pain. Among which Trigeminal neuralgia is most common form which affects 5th cranial nerve, one of the most widely distributed nerves in the head. It is characterized by severe unilateral paroxysmal facial pain, often described by patients as the "the world's worse pain". The incidence of Trigeminal Neuralgia is 5.7 per 100,000 women and 2.5 per 100,000 men in India[8]. Pain is triggered by touch, chewing and shaving which hampers the day to day activities of the person like eating, sucking, communication & social participation. Generally Carbamazepine, Oxcarbazepine, Baclofen, Lamotrigine, and Pimozide are considered for treatment.

Transcutaneous Electrical Nerve Stimulation, Relaxation technique, hot moist packs, Isometric neck exercises are traditionally being used to reduce pain in facial neuralgia. TENS produces eletro-analgesia probably by one or of the following mechanisms: Presynaptic inhibition in the dorsal horn of the spinal cord, endogenous pain control (via endorphins, enkephalins, and dynorphins), direct inhibition of an abnormally excited nerve and restoration of afferent input.

Mirror therapy has been found effective for the treatment of pain in phantom limbs and complex regional pain syndromes. With a mirror between the limbs; the patient can see the intact limb and the reflection of it in a place where the affected limb could be. Pain relief through mirror therapy has been well described in the literature over the past 20 years. The neuroscientific mechanisms at work, however, are still subject to much debate. Imaging studies have shown a correlation of cortical changes in relation to pain and a reversal of these changes when phantom limb pain was reduced. The motor cortex, the sensory cortex, and the premotor cortex are involved in these changes.

NEED FOR THE STUDY

The rationale to carry out this study was that although pharmacotherapy may reduce intensity of pain in neuropathic disorders, its role in improving quality of life and emotional and physical functions is less consistent. Drug-related adverse effects are common in the treatment of neuropathic pain. Despite that, non-pharmacologic treatments have received little study in patients with neuropathic pain although these may provide an additional benefit beyond that obtained from pharmacologic treatment alone.[6]

Mirror Therapy is inexpensive, non-invasive and safe with no major side effects and can be safely administered to patients following simple training. There are evidences of using Mirror Therapy to reduce complex regional pain syndrome, phantom limb pain syndrome but hardly any studies are reported which have specifically used or recommended the use of Mirror Therapy in treatment of facial neuralgia. This study was undertaken to observe the efficacy of Mirror Therapy along with Conventional Therapy in facial Neuralgia patients who were refractory or partially responsive to drug therapy.

AIM:-

- To study Effectiveness of Mirror Therapy along with Conventional Therapy compared to conventional Therapy alone on Facial Neuralgia Pain.

Objectives:-

- To reduce facial pain.
- To improve Oro-motor activities.

METHODOLOGY

Study design: Prospective comparative study.

Ethical consideration: Study protocol, informed consent documents, case record form were reviewed and approved by Institutional Ethics Committee. The study was initiated after receiving an approval from Institutional Ethics Committee as well as The Maharashtra University of Health Sciences.

Study set up : Occupational therapy centre, Tertiary care Hospital.

Time duration : 18 months

- Patients were referred to Occupational Therapy Department from ENT OPD and Medicine OPD.
- Patients with Facial Neuralgia fulfilling the inclusion criteria were recruited for the study. They were conveniently allocated to 2 groups by convenient sampling method. Total 46 patients were screened for the study (19 male, 27 female) out of which 6 (4 male, 2 female) patients excluded from the study as they were not

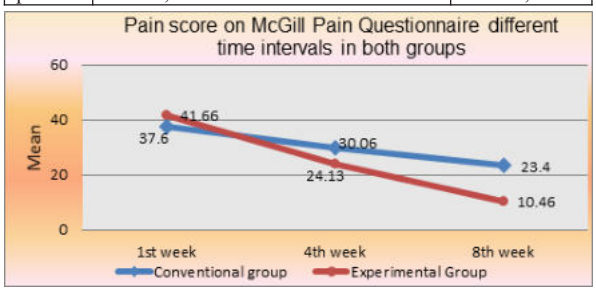
fulfilling the inclusion criteria. So 40 patients were recruited for the study (16 male, 24 female). Out of 40 patients, due to 10 drop outs, study was conducted on 30 patients with 15 patients in each group. Although the inclusion criteria mentioned patients with symptoms of facial pain including diagnosis as Trigeminal Neuralgia / Anterior Ethmoidal Syndromme / Stylalgia / glassopharyngeal neuralgia, maximum patients referred were diagnosed with trigeminal neuralgia as incidence rate of rest of conditions is rare. Hence all patients included in the study had same diagnosis of Trigeminal Neuralgia. Patient's informed consent form was taken and assessed with McGill Pain Questionnaire and detail general evaluation. Patients were assessed at the time of entry level, after 1 month & at the end of the t/t session i. e. after 2 months on the outcome measures mentioned. The treatment will be provided for 2 month i.e. 8 weeks. Patients will be advised to continue their medications

- **Group A (Conventional group)** will receive conventional occupational therapy (5 days in a week) which includes
- Transcutaneous Electrical Nerve Stimulation for 15 min
- Relaxation techniques – Deep breathing exercises and visual imagery (07 min)
- Hot moist packs for trapezius muscle for 7 min
- Neck isometric exercises for strengthening 10 min, 5 repitations on each side.
- Each session last for 40-45 min, 5 times a week
- **Group B (Experimental Group)** will receive Mirror Therapy along with occupational conventional therapy
- Set up of Reversed Mirror Image will be designed for experimental group in which two mirrors of 35x45cm with smoothed edges, taped at the back of the interface of the long sides, will be placed on the desk in front of the seated patient at an angle of slightly less than 90 degrees, so that the patient will be able to see her/his reversed mirror images slightly to the right and to the left of the mirror-junction.
- Tactile stimulation (tapping , massage) of unaffected side by the therapist for 15 min along with facial activities in the form of various facial expression of unaffected side - (5 times each as tolerated by the patient) which includes –puffing cheek, Raising eye brow and eye lid, Closing and opening eye, Clenching one side teeth, Raising nasolabial fold & Conventional therapy is same as above for group A. Each session last for 40 – 45 min, 5 times a week. Home programme for both the groups will include –Relaxation techniques, hot moist packs application, neck isometric exercises should be practiced 2 times at home. Activities (as tolerated) like – candle blowing, Balloon blowing, Placing thermacollballs from one bowl to another by straw & Making various facial expressions in the mirror.

RESULT & DATA ANALYSIS :

Table No. 1. Comparison of pain score on McGill Pain Questionnaire at different time intervals in both groups

Time	Conventional group	Experimental Group		
	Mean	SD	Mean	SD
1st week	37.6	9.12	41.66	9.27
4th week	30.06	8.17	24.13	10.35
8th week	23.4	8.72	10.46	4.71
F-value	761.92		305.91	
p-value	<0.0001,HS***		<0.0001,HS***	

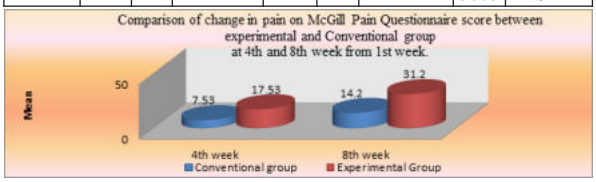


Graph No. 1. Comparison of pain score on McGill Pain Questionnaire at different time intervals in both group

Table No. 1 & Graph No 1showed that mean pain score at 1st, 4th and 8th weeks in conventional group was 37.6, 30.06 and 23.4 respectively. On applying One-way repeated measure ANOVA, There was significant reduction in score at 4th and 8th weeks (F=761.92,p<0.0001,HS). In experimental group, mean pain score at 1st, 4th and 8th were 41.66, 24.13 and 10.46 respectively. One-way repeated measure ANOVA test showed that there was significant reduction in pain score at 4th and 8th weeks (F=305.91,p<0.0001,HS***).

Table No. 2 .Comparison of change in pain on McGill Pain Questionnaire score between experimental and Conventional group at 4th and 8th week from 1st week.

Time	Conventional group			Experimental Group			t-value	p-value
	Mean	SD	Median (Range)	Mean	SD	Median (Range)		
4th week	7.53	1.12	8(6-10)	17.53	2.38	17 (13-21)	14.6785	<0.0001, HS***
8th week	14.2	1.69	14(11-16)	31.2	5.33	34 (22-36)	11.7605	<0.0001, HS***



Graph No. 2. Comparison of change in pain on McGill Pain Questionnaire score between experimental and Conventional group at 4th and 8th week from 1st week.

Table no. 2 and Graph No.2 shows that In conventional group, change in mean pain score at 4th week was 7.53 from baseline and in experimental group, it was 17.53. There was highly significant more reduction in pain score in experimental group as compared to conventional group (7.53 vs 17.53,p<0.0001,HS***).

Where as mean change in pain score at 8th week in conventional group was 14.2 and 31.2 in experimental group. Independent t-test showed that there was significantly more reduction in pain score in experimental group as compared the conventional group (14.2 vs 31.2, p<0.0001,HS***)

DISCUSSION

The study was conducted on total 30 patients who were diagnosed as facial neuralgia. These patients were divided into two groups, conventional group (group A) who received conventional Occupational therapy alone which included TENS, moist heat for trapezius, neck isometric exercises and relaxation techniques including deep breathing and visual imagery and experimental group (group B) received mirror therapy along with conventional Occupational therapy. Evaluations were carried out for both groups at week 1, week 4, week 8 by using McGill Pain Questionnaire.

This study has been attempted to find out efficacy of mirror therapy along with conventional occupational therapy as compared to conventional occupational therapy alone to reduce facial neuralgia pain.

The results of the study are summarized as follows:

With data analysis of pain reduction by McGill Pain Questionnaire assessment , Table No. 1 and Graph No. 1 showed that on applying One-way repeated measure ANOVA, There was significant reduction in mean pain score of conventional group at 4th and 8th weeks(F=761.92,p<0.0001,HS). In experimental group, one-way repeated measure ANOVA test showed that there was significant reduction in mean pain score at 4th and 8th weeks (F=305.91,p<0.0001,HS***).

Conventional therapy included – TENS, moist heat, deep breathing exercises, visual imagery and neck isometrics gave highly significant result in pain reduction.

Reduction of pain factor in conventional therapy group may be because of the effect of TENS which broadly works in two ways. Firstly, TENS uses soothing pulses that are sent via the pads through the skin and along the nerve fibers. The pulses suppress the pain signal to the brain via pre-synaptic initiation of noxious information in the afferent C fibers. This mechanism works based on the gate control theory proposed by the Melzack and Wall's. Secondly, it may also excite higher centers causing release of endogenous opiods that have descending inhibitory effect at the dorsal horn binding to receptors on nociceptive afferent neurons, so inhibiting the release of substance.

Application of hot moist pack helps in reducing the muscle spasm & mainly involves the direct influence of heat on muscle spindles and on sensory nerve conduction. It decreases the neuronal activity of secondary endings, increases the activity of primary ending and Golgi Tendon organ that produces a net inhibitory influence of motor neuron pool, breaking the vicious circle of pain-spasm-pain.

Relaxation techniques (deep breathing exercises, visual imagery/ distraction technique) may aid in reducing pain, tension, depression and relaxes the muscles. Isometric neck exercises may help to improve the endurance of neck muscles thereby reducing the effect of prolonged sustained neck posture in one position. The analgesic effects of exercise are generally attributed to the production of beta-endorphins during physical exercise.[6,16,28,29,40,42]

The results are correlating with the study done by **Dildip Khanal, Subhash M Khatri and Deepak Anap (2014)** on, "**"Is there Any Role of Physiotherapy in Fothergill's Disease?".** The results showed that pain was significantly reduced on VAS ($p<0.01$). The pre-interventional mean±SD was 6.6±1.140 which reduced to 3.8±0.836 with t-value 14.000. Pain was significantly reduced on BPI-facial ($p<0.01$). The pre-interventional mean±SD was 88±9.274 reduced to 57±7.969 with t value 29.557.

Table no. 2 and Graph No.2 showed that In conventional group, There was highly significant reduction in mean pain score in experimental group as compared to conventional group (7.53 vs 17.53,$p<0.0001$, HS***) at 4th week . Whereas Independent t-test showed that there was significant reduction in pain score in experimental group as compared the conventional group (14.2 vs 31.2, $p<0.0001$,HS***) at 8th week.

In experimental group along with TENS, hot moist pack, deep breathing exercises, visual imagery and neck isometrics mirror therapy was given which showed the promising result in pain reduction than conventional group.

Mirror therapy has been found effective for the treatment of pain in phantom limbs and complex regional pain syndrome with a mirror between the limbs; the patient can then see the intact limb and the reflection of it in a place where the affected limb could be. Pain relief through mirror therapy has been well described in the literature over the past 20 years. The neuro-scientific mechanisms at work, however, are still subject to much debate. Imaging studies have shown a correlation of cortical changes in relation to pain and a reversal of these changes when phantom limb pain was reduced. The motor cortex, the sensory cortex, and the premotor cortex are involved in these changes. Reactivation of the representation area of the affected limb in the sensorimotor cortex has been shown in fMRI studies to correlate with pain reduction after mirror therapy in phantom pain and in plexus avulsion. Reversal of dysfunctional cortical changes was reported after mirror therapy. Researchers observed activation in the frontoparietal network during self-attribution of observed movement combined with visual mismatch, which might also have been the case in study patients. However, there seems to be no research to date using a reversed mirror set-up investigating the influence of laterality and transcallosal innervation.[9,10]

Lots of literature is available on effectiveness of mirror therapy in phantom limb pain and motor recovery of hand in stroke patients but hardly literature are available on use of mirror therapy in facial neuralgic pain.

The results are correlating with the study done by Sirisha Nekkanti, B.Santhi on, "A Comparative Study To Find Out The Effect Of Mirror Therapy With Electrical Stimulation And Mirror Therapy Only On Functional Recovery Of Hand In Stroke Subjects" . 30 subjects with cerebrovascular accidents or stroke where selected for study and randomized into two groups. The results showed Comparison between pre 41.33±8.095 and post 50.267±8.276 test values of Experimental group considered extremely significant with P value<0.0001 and t value of 17.793. Comparison between the pre 40.600± 8.500 and post 42.533± 9.195 test values of Control group considered extremely significant with P value <0.0001 with t value 5.398. Comparison between the post test values of both the groups 50.267±8.276 and 42.533±9.195 considered significant with P value 0.02222 with t value 2.421. From results it was concluded that Improvement on functional recovery of hand was more in mirror therapy and electrical stimulation group when compared with mirror therapy alone.

In 2014 **"Clear Effect of Mirror Therapy on Trigeminal Neuralgia Pain"** by **Annegret Hagenberg**, showed pain reduction in trigeminal neuralgic lady. A single case study was done on middle-aged lady was offered Mirror Therapy for her long-standing TN. She experienced pain relief repeatedly and reliably after 10 minutes of massage applied by others therapist or partner. Touch and massage was applied to the patient's left (unaffected) cheek whilst she was sitting still and watching the procedure in the reversed mirror set-up. The intervention was given for 7 weeks which showed the reliable pain reduction (on VAS Scale) seen here suggests further use of MT for TN. during which time she took Carbamazepine only on very rare occasions. The TN pain continued to decrease to 2/10.

So, study concluding that Mirror Therapy along with conventional occupational therapy is helpful in pain reduction of facial neuralgic patients .

LIMITATIONS:

- Study done on small sample size.
- No intensity rating of specific pain sensation is given in the scale.
- There is no complete cessation of pain factor.
- Follow up of the patients could not be done after 4 months of treatment so therapy after effect could not be assessed.

Strengths :

- Mirror Therapy is cost effective adjunctive modality and it can be easily fabricated for the patients.
- Portable.
- It has no side effects.

CONCLUSION

After analyzing the data in light of existing literature, it can be concluded that

- The mirror therapy along with conventional occupational therapy is effective to reduce facial neuralgia pain than conventional occupational therapy alone.
- So mirror therapy is effective and should be used as an adjunctive therapy along with conventional treatment to reduce facial neuralgia pain.
- Mirror therapy along with conventional occupational therapy effective to improve oromotor activities.
- Mirror therapy along with conventional occupational therapy effective to improve social activities.

FUTURE RECOMMENDATION:

- The study can be done on a large population.
- Study can be done by using Kinesiology taping and Myofacial release techniques along with Mirror therapy.
- Follow up of the patient should be kept for more than 6 months to check therapy after effect.

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