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Comparison of Electrical Dry Needling Versus Transcutaneous Electrical Nerve Stimulation on Improving Shoulder Pain and Function in Subjects with Hemiplegic Shoulder Pain

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Abstract

Background and Objective: Hemiplegic shoulder pain is a common complication of stroke individuals which can hinder participation in rehabilitation and has been associated with poor outcomes. TENS is the most used modality whereas Electrical Dry Needling is one of the new adjunct treatments of choice with exercise therapy to reduce pain and improve function for shoulder rehabilitation in Physiotherapy. The main objective of the study was to investigate the effect of Electrical Dry Needling on hemiplegic shoulder pain in reducing shoulder pain and improving shoulder function in post stroke subjects.

Methods: This is a Quasi experimental study. 86 subjects with mean age of 52 years clinically diagnosed with hemiplegic shoulder pain in stroke. They were randomly allocated in two groups, in Group A (n=43) subjects were treated with Electro Dry Needling along with standardised rehabilitation programme whereas in Group B (n=43) subjects were treated with Transcutaneous Electrical Nerve Stimulation along with standardised rehabilitation programme. Participants were given intervention thrice a week for six weeks the outcomes of this intervention were measured by VAS and SPADI for pain, disability, and function.

Results: Independent't' test was used to compare the mean significance difference between continuous variables. Paired't' test was used to assess the statistical significant difference between pre and post test scores. Statistical analysis of the data revealed that within group

comparison both groups showed significant improvement in all parameters, where as in between group's comparison Electrical Dry Needling along with Standardised Rehabilitation Programme showed better improvement compared to Transcutaneous Electrical Nerve Stimulation along with Standardised Rehabilitation Programme.

Conclusion: After six weeks of intervention both Group A and Group B showed significant improvement in reducing pain and improving shoulder function, however electrical dry needling (EDN) showed more significant improvement when compared to transcutaneous electrical nerve stimulation (TENS). The study concludes that Electrical Dry Needling is more useful adjunct in treating hemiplegic shoulder pain along with standardised rehabilitation programme.

Keywords: Stroke, HSP, TENS, EDN, Dry Needling Standardised Rehabilitation Programme, VAS, SPADI.

Introduction

According to World Health Organization, Cerebrovascular Accidents (CVA) is a clinical syndrome characterized by rapidly increasing clinical signs of localized disruption of brain function lasting more than 24 hours and leading to death if untreated.

The incidence rate of CVA is 1.5% to 2% per thousand cases worldwide, where as in India, there are 200 to 250 CVA cases for every 1, 00,000 people. CVA problems are expected to affect 1.1% of rural Indians and 1.9% of urban Indians. The age specific incidence of CVA rises with each decade of life with fewer than 45 years old experiencing 0.2% to 0.3% cases per 1000 cases for a year and 75–85-year-old experiencing 10 to 20 cases per 1000 cases for an year. After the event, commonly seen impairments are sensory, motor, posture, balance, cognitive, bowel, bladder and speech, language, and swallowing. Sensory problems include pain, abnormal sensations, visual changes as well as motor problems include weakness, altered tone, abnormal synergy, and reflexes, altered voluntary control and proprioception. All primary issues are associated with CVA. Moreover, cardiovascular, neurological, integumentary, and musculoskeletal changes are observed after the attach. These all-secondary issues are also associated with stroke.

Since Hemiplegic Shoulder Pain (HSP) following CVA has been reported to affect 70% of patients, it is one of the most common impairments that a physiotherapist addresses. 75% of patients report experiencing discomfort in the first twelve months after following a CVA, and it usually begins in the first few days. Thus, the patient participation in rehabilitation is impacted and motion of the affected extremity is decreased. In turn, the discomfort and decreased participation in rehabilitation slows down the recovery and resulting in negative impact on functional rehabilitation which has been associated with fewer favorable outcomes and longer hospital stay.

Hemiplegic Shoulder Pain is a challenge to patients as it reduces participation in rehabilitation, discourages motion, hinders recovery, and adversely affects the activities related to self-care, balance transfers and ambulation. Hemiplegic shoulder pain can be treated in acute stage of recovery after diagnosing. if it is untreated the recovery would be delayed and poor outcomes and functional disability is observed.

Management of hemiplegic shoulder pain includes both pharmacological and non-pharmacological agents, Physiotherapy exercises and modalities which helps to increase the shoulder function and reduces the pain by positioning the shoulder in proper position (commonly

suggested position for shoulder is abduction, external rotation, and flexion), bracing strapping, slings and taping the shoulder to maintain the position and helps to stabilize the shoulder joint. Pain can be decreased through modalities like Transcutaneous Electrical Nerve Stimulation (TENS), Functional Electrical Stimulation (FES), Relaxation Techniques and Physical Therapy techniques includes sensor motor training, manual therapy and strengthening exercises helps to maintain muscle tone, stretching helps to improve the shoulder flexibility, dry needling (DN) and application of heat and cold therapy helps to relieve the shoulder pain. Pharmacological agents like analgesics, sympathetic blockers, suprascapular nerve blockers, corticosteroid injection, botulinum toxic injection helps to decrease the pain and improves shoulder function and quality of life.

Transcutaneous Electrical Nerve Stimulation is a common treating therapeutic modality in physiotherapy for various musculoskeletal and neuromuscular pain disorders. TENS is a non-invasive, analgesic stimulation for musculoskeletal and neuromuscular pain disorders. Its analgesic mechanism is based on the gate control theory of pain, which states that by stimulating the large nociceptive afferent (Aß) fibers, peripheral pain inhibition can be achieved. Previous studies found that TENS was effective in reducing post stroke shoulder pain, discomfort, stiffness, and impairment of upper limb function.

Dry Needling has been recently introduced as a new therapeutic approach for improving post stroke spasticity and pain relief. However, in the majority of these trails the effects of dry needling studied alone. Combining therapeutic techniques has been proven that it shows better results than using as a single method.[9] Electrical dry needling (E-DN) is an invasive procedure that involves stimulation of Trigger Points using a monofilament needle with help of alligator cable clips.

Electrical Dry Needling is a new intervention introduced in therapeutic rehabilitation program to decrease pain and improve function in shoulder pain, low back pain, neck pain and heel pain and in research there are limited studies are published on electro dry needling in treating pain. Dry Needling commonly used in treatment of neuromusculoskeletal pain syndromes and it is an intra-muscular procedure in which the needles are inserted into nodules within tense bands of muscle, often known as trigger points (TrPs) or myofascial trigger points (MTrPs) and precisely, the terms known as Intramuscular manual therapy (IMT) and Trigger point dry needling (TDN) by certain professional organizations to describe the practice of dry needling.

Thus, the main idea of the study is to compare the effect of Electrical dry needling and transcutaneous electrical nerve stimulation to decrease the pain and improve function in subjects with Hemiplegic Shoulder Pain

Materials and methods

Study design: Quasi experimental study

Ethical clearance and informed consent: The study protocol was approved by the Ethical Committee of GSL Medical College & General Hospital (Annexure-I) the investigator explained the purpose of the study and given the subject information sheet. The participants were requested to provide their consent for participation in the study (Annexure-II). All the participants signed the informed consent and the rights of the included participants have been secured.

Study population: Subjects with Post Stroke Shoulder pain.

Study setting: Out Patient Department, Department of physiotherapy, GSL general hospital, Rajamahendravaram.

Study duration: Study was conducted for a period of One Year.

Intervention duration: 18 sessions, 3 days a week for six weeks.

Study method: Convenience sampling

Sample size: A total number of 93 subjects were screened in that 86 patients were recruited who are willing to participate in the study. All the selected participants were explained about the study after obtaining informed consent form and meeting the criteria. All the eligible participants are allocated by convenience sampling and randomized to two groups with 43 members.

Group A: Electrical Dry Needling (43 subjects)

Group B: Transcutaneous Electrical Nerve Stimulation (43 subjects)

Materials used Transcutaneous electrical nerve stimulation, Dry needles, Alligator cable clips, Thera Band's.

Results

The results of the study were analyzed by VAS & SPADI to reduce shoulder pain and improve upper limb function in hemiplegic shoulder pain due to stroke. The concert floor chart of the study showed the study organization in terms of subject screening random allocation and analysis following the intervention. A total of 93 subjects were screened for eligibility, amongst 86 subjects were included in the study trial. All the 86 subjects who met inclusion criteria have undergone baseline assessment and included subjects for randomized into two groups consisting of 43 in Group A and 43 in Group B and after drop outs 41 participants from both groups were analyzed, the results showed that there is a statistical difference in two groups.

Discussion

The purpose of the study was to investigate the effect of Electrical dry needling on reducing shoulder pain and improving function in subjects with hemiplegic shoulder pain. Now a days Electrical dry needling has been using as a Therapeutic modality in some clinics and rehabilitation center by decreasing pain. Several studies reported that effects of Electrical dry needling shown a positive effect by reducing pain and improving function and there are limited studies published on Electrical dry needling in reducing pain and improving function.

TENS is a common therapeutic modality used by a clinician in their daily life practice, and it proved by showing better outcomes and results by reducing the pain and improving the function in patients with hemiplegic shoulder pain but there a no studies done until now by comparing Electrical dry needling and Transcutaneous electrical nerve stimulation. The two interventions were similarly effective to reduce pain.

In Electrical dry needling it improves local circulation by causing vasodilation in small blood vessels and improves the blood circulation and oxygen supply to the muscle tissue, and pain is reduced by local twitch response, which is an involuntary spinal reflex and produce local and central nervous responses to restore haemostasis at the trigger point, resulting in a decrease in both central and peripheral pain sensitization. But dry needling has less serious adverse effects like soreness and post needling pain.

In TENS, Pain relief via the pain gate mechanism involves activation (excitation) of the A beta (Aβ) sensory fibres, which reduces the transmission of the noxious stimulus from the 'c' fibres to the spinal cord

and thus to the higher centres. The Aβ fibres appear to prefer being stimulated at a relatively high frequency HF (in the 90 - 130 Hz range). It is difficult to find evidence to support the idea that there is a single frequency that works best for every patient, but this range appears to cover the vast majority of people. An alternative approach is to stimulate the A delta (Aδ) fibres, which respond preferentially to a much lower frequency LF (in the order of 2 - 5 Hz), activating the opioid mechanisms and providing pain relief by causing the release of an endogenous opiate (encephalin) in the spinal cord, which reduces the activation of the noxious sensory pathways.

In our study the findings as shown that group A is more statistically significant than group B by reduction in (P< 0.001) (VAS & SPADI). In this programme the training restored the joint stability, pain reduction and help in improving functional joint mobility and range of motion which was more effective in Electrical dry needling group when compared to TENS group.

The study findings proved that after six-week intervention programme of Electrical dry needling was more effective than Transcutaneous electrical nerve stimulation in reducing shoulder pain and improving upper limb shoulder function. Thus, the study concludes that Electrical dry needling is more effective than transcutaneous electrical nerve stimulation in reducing pain and improving function in HSP.

Conclusion

The present study concludes that after six weeks of Interventions both groups were shown statistically significant improvement in post-test values. However, Electrical dry Needling along with Standardized Rehabilitation Programme is more effective when compared to the Transcutaneous Electrical Nerve Stimulation with Standardised Rehabilitation Programme. Thus, this study concludes that Electrical dry Needling is a useful adjunct in Hemiplegic Shoulder Pain along with Rehabilitation.

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