



# Effectiveness Of IFT With Iontophoresis In The Management Of Trapezitis With Subacute Pain – A Pilot Study.

*A Experimental Study*

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**Abstract:** Neck pain is reported by many people who are at risk of experiencing musculoskeletal disorders due to muscle stiffness and hypokinetics. Trapezius is common musculoskeletal complaint characterized by pain, stiffness and tightness of the upper trapezius muscle. It is often work related and caused by prolonged static and repetitive work tasks. so This study aim to find out the effectiveness of IFT with iontophoresis in the management of trapezitis so the best and most effectiveness treatment can be followed.

**Aim:** To study the effectiveness of IFT with Iontophoresis in the management of trapezitis with subacute pain.

**Methodology:** A Experimental study was done in which 15 subjects with age group of 18 to 40 years, having mechanical neck pain for atleast 3 months using purposive sampling as per inclusion and exclusion criteria. Data was collected, statistical analysis was done and results were tabulated.

## **Data Analysis and Result:**

after applying paired t- test pre vs post , there was statistically significant difference between the pre treatment mean(5.333) and the post treatment mean(2.866) of pain and p-value <0.05

after applying paired t- test pre vs post , there was statistically significant difference between the pre treatment mean(1.8) and the post treatment mean (0.666) of tenderness and p-value <0.05

after applying paired t- test pre vs post , there is statically no significant difference in pre treatment mean(41.333) and post treatment mean(42.333) of cx flexion and p-value >0.05.

after applying paired t- test pre vs post , there is statically no significant difference in pre treatment mean(42.666) and post treatment mean(43.666) of cx extension and p-value >0.05.

after applying paired t- test pre vs post , there is statically significant difference in pre treatment mean of Contralateral lateral flexion (42.666) and post treatment mean of Contralateral lateral flexion(63.666) and p-value <0.05.

there is statically no significant difference in pre treatment mean of Ipsilateral lateral flexion(42.333) and post treatment mean of Ipsilateral lateral flexion(43) and p-value >0.05.

after applying paired t- test pre vs post , there is statically no significant difference in pre treatment mean of Ipsilateral cx rotation(62.333) and post treatment mean of Ipsilateral cx rotation(63.8) and p-value >0.05.

there is statically no significant difference in pre treatment mean of Contralateral cx rotation(63) and post treatment mean of Contralateral cx rotation(63.8) and p-value >0.05.

**Conclusion:** The study thereby concludes that sodium diclofenac with Interferential therapy is effective for improving pain and range of motion.

**Index Term– Iontophoresis, IFT, Sodium diclofenac, Trapezius, Goniometer.**

## I. INTRODUCTION

Trapezius pain is the classic stress pain and it is the most common musculoskeletal disorder. It is usually caused by placing too much stress or strain over the trapezius muscle. The upper trapezius muscle is designated as postural muscle and it is highly susceptible to overuse.<sup>[1]</sup> Trapezius muscles help with the function of neck rotation, side bending and extension. Tightness in the muscles can decrease the range of motion of the neck. The decrease in motion can negatively affect the mobility of the cervical joints. Limited range of motion creates an increase in soft tissue tightness, with an ensuing pain-spasm cycle which can be difficult to break.<sup>[1]</sup> Subacute pain comprises the interval from the end of the first month to the beginning of the seventh month of continued pain.<sup>[2]</sup> Diclofenac is a commonly used non-steroidal anti-inflammatory drug (NSAID) for symptom control in osteoarthritis (OA) of the knee and soft tissue injuries.<sup>[3]</sup> Although treatment with oral diclofenac is associated with serious adverse effects involving both the gastrointestinal upset and renal systems, these adverse effects are thought to be limited with topical diclofenac formulations without loss of efficacy.<sup>[3]</sup> Diclofenac is a non-steroidal anti-inflammatory drug (NSAID) advocated for use in painful and inflammatory rheumatic and certain non-rheumatic conditions.<sup>[4]</sup> In numerous clinical trials the efficacy of diclofenac is equivalent to that of the many newer and established NSAIDs with which it has been compared.<sup>[4]</sup> As an analgesic it has a fast onset and long duration of action.<sup>[4]</sup> Thus, diclofenac can be considered as one of the few NSAIDs of 'first choice' in the treatment of acute and chronic painful and inflammatory conditions.<sup>[4]</sup> diclofenac exerts its action via inhibition of prostaglandin synthesis by inhibiting cyclooxygenase-1 (COX-1) and cyclooxygenase-2 (COX-2) with relative equipotency.<sup>[5]</sup> However, extensive research shows the pharmacologic activity of diclofenac goes beyond COX inhibition, and includes multimodal and, in some instances, novel mechanisms of action (MOA).<sup>[5]</sup> Therapists often use transcutaneous electrical stimulation to treat their patients.<sup>[6]</sup> They can select alternating current of various frequencies or direct current applied continuously or as a train of pulses.<sup>[6]</sup> Each type of current has both advantages and disadvantages when used therapeutically. Direct current and low-frequency alternating currents (> 1 kHz) encounter a high electrical resistance in the outer layers of the skin. This makes the treatment of deep structures painful because a large transcutaneous current must flow so that adequate current passes deeply.<sup>[6]</sup> Alternating currents of medium (> 1kHz to < 10kHz) or high frequency (> 10kHz) meet little resistance (due to a marked Alternating currents of medium (> 1kHz to < 10kHz) or high frequency (> 10kHz) meet little resistance (due to a marked reduction in

the effects of skin capacitance upon current flow) and penetrate the tissues easily, although such currents generally oscillate too rapidly to stimulate the tissues directly. These difficulties were overcome in the early 1950s with the development of interferential current therapy.<sup>[6]</sup> The equipment produces two alternating currents of slightly differing medium frequency and is used widely to induce analgesia, elicit muscle contraction, modify the activity of the autonomic system, promote healing, and reduce oedema.<sup>[6]</sup> Use of interference effects in therapy When two or more sinusoidal currents alternate at the same frequency, rising and falling at exactly the same time, they are said to be in phase. Waves become out of phase when they are a half wavelength out of step and the rising segment of one coincides with the falling segment of the other. Waves in phase interfere constructively to produce a resultant wave with an amplitude greater than that of either of the originals. Waves out of phase interact in a similar way but interfere destructively to cancel each other out. Interference also occurs between waves of slightly differing frequency. As one wave peak 'catches up' with the other, constructive interference causes an increase in the amplitude of the resultant wave.<sup>[6]</sup> The analgesic effect of interferential therapy can be explained in part by the inhibition of type C nociceptive fibres, although other mechanisms are certainly involved. 'Pain gate theory', proposed by Melzack and Wall and much modified subsequently remains central to this explanation.<sup>[6]</sup> Iontophoresis is a noninvasive method of systemic and local drug delivery by means of a current.<sup>[7]</sup> Iontophoresis is a novel drug delivery system designed to improve the delivery rate of compounds.<sup>[8]</sup> Passive delivery of most compounds across different epithelia is limited due to the barrier properties afforded by these epithelia. The technique generates an electrical potential gradient that facilitates the movement of solute ions across the membrane. By definition, iontophoresis is the increased movement of ions in an applied electric field.<sup>[8]</sup> Iontophoresis is based on the general principle that 'like charges repel each other, and unlike charges attract each other. An external energy source can be used to increase the rate of penetration of drugs through the membrane. When a negatively charged drug is to be delivered across an epithelial barrier, it is placed under the negatively charged delivery electrode (cathode) from which it is repelled, to be attracted towards the positive electrode placed elsewhere on the body.<sup>[9]</sup>

## II. METHODOLOGY

This study was conducted on 60 Bharatnatyam Dancers with 5 or more years of experience, age 15-30 years old in Pune. Ethical committee clearance was obtained. Written consent was taken from the subjects who fulfill the inclusion and exclusion criteria. Testing procedure was explained and demonstrated to the subjects. Participants were given 2 trials for each test and best results were noted.

### II.A INCLUSION CRITERIA

- Males and females
- Who are willing for participation
- The participant's age ranged from 18 to 40 years.<sup>[10]</sup>
- NPRS score 5/10
- mechanical neck pain for at least 3 months.<sup>[10]</sup>

**II.B EXCLUSION CRITERIA**

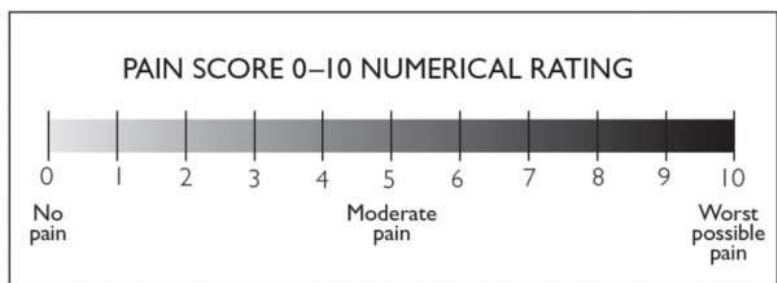
- Patients undergoing any other physiotherapy treatment interventions
- positive neurological symptoms or abnormal neurological signs in the upper limbs relating to nerve entrapment.<sup>[10]</sup>
- Patients who are not eligible for electrotherapy due to contraindications such as a pacemaker, epilepsy, dermatological skin condition, abnormal sensation.

**II.C OUTCOME MEASURE**

1] Numerical pain rating scale (NPRS)

Inter rater reliability – 0.95

Intra rater reliability – 0.95



2] Universal goniometer

Intra-rater reliability - 80 to 0.99

Inter-rater reliability - 0.71 to 0.94



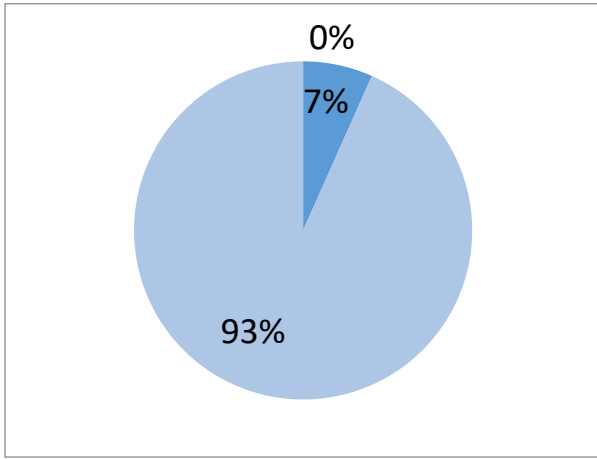
**III. STATISTICAL ANALYSIS AND RESULT**

Data collection

Table 1- Demographic data

Demographic data	Subjects
Male	1
Female	14

Graph No 1 – Demographic data

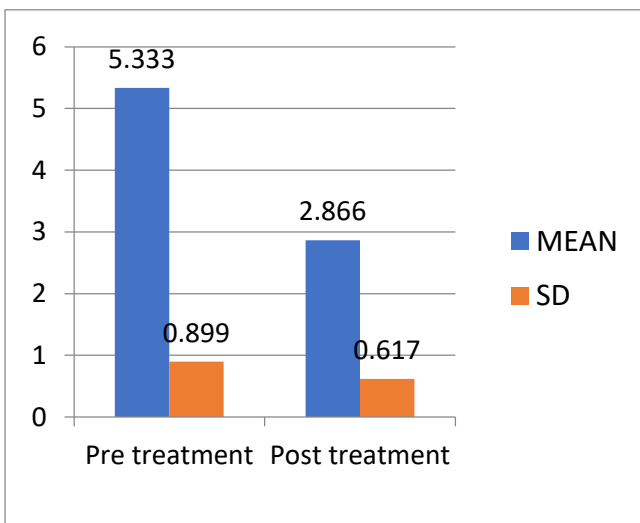


Interpretation- There are 7% of males and 93% of females.

Table No 2 - Pre and post Pain intensity in trapezitis with subacute pain

Pain intensity	Pre treatment	Post treatment	P-value
MEAN	5.333	2.866	0.001
SD	0.899	0.617	

Graph No 2- Pre and post Pain intensity in trapezitis with subacute pain

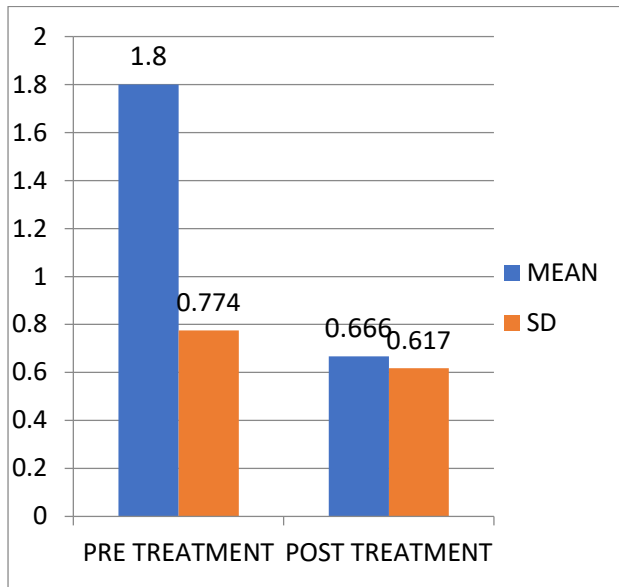


Interpretation- There is significant difference between the mean of pre pain intensity and post pain intensity

Table No 3-Pre and post treatmentt tenderness in trapezitis with subacute pain

Tenderness	Pre treatment	Post treatment	P -value
MEAN	1.8	0.666	0.001
SD	0.774	0.617	

Graph No 3- Pre and post treatmentt tenderness in trapezitis with subacute pain

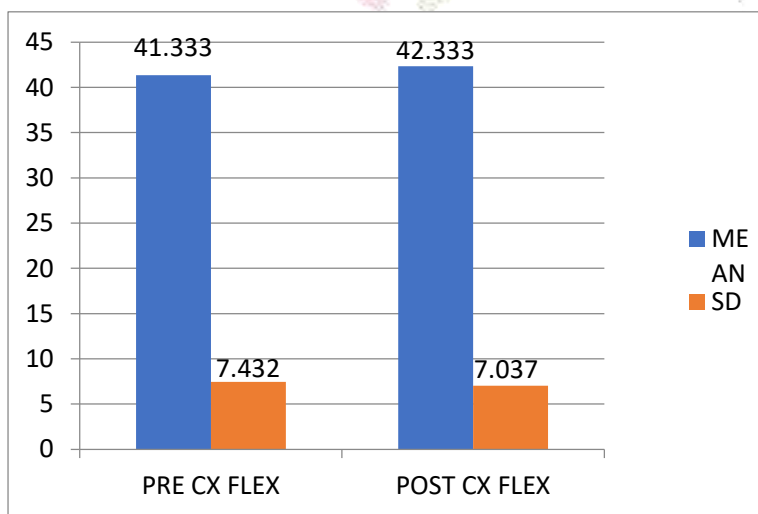


Interpretation- There is significant difference between the mean of pre treatment tenderness and post treatment tenderness.

Table No 4-Pre and post cervical flexion in trapezitis with subacute pain

	PRE FLEX CX	POST FLEX CX	P-value
MEAN	41.333	42.333	0.2500
SD	7.432	7.037	

Graph No 4 -Pre and post cervical flexion in trapezitis with subacute pain

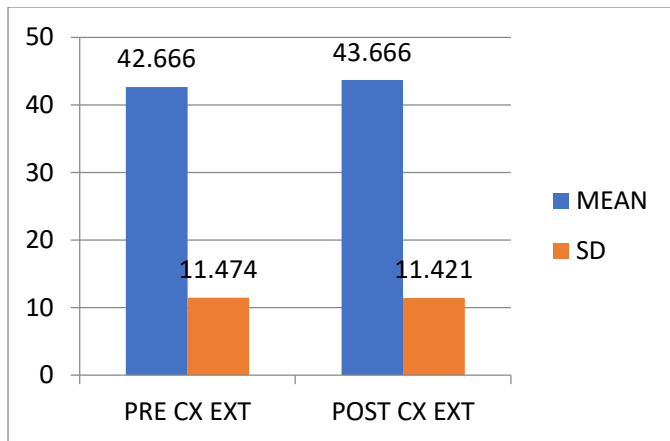


Interpretation: There is no significant difference between the mean of pre treatment cx flexion and post treatment cx flexion .

Table No 5-Pre and post cervical extension in trapezitis with subacute pain

	PRE CX EXT	POST CX EXT	P-value
MEAN	42.666	43.666	0.5000
SD	11.474	11.421	

Graph No 5- Pre and post cervical extension in trapezitis with subacute pain

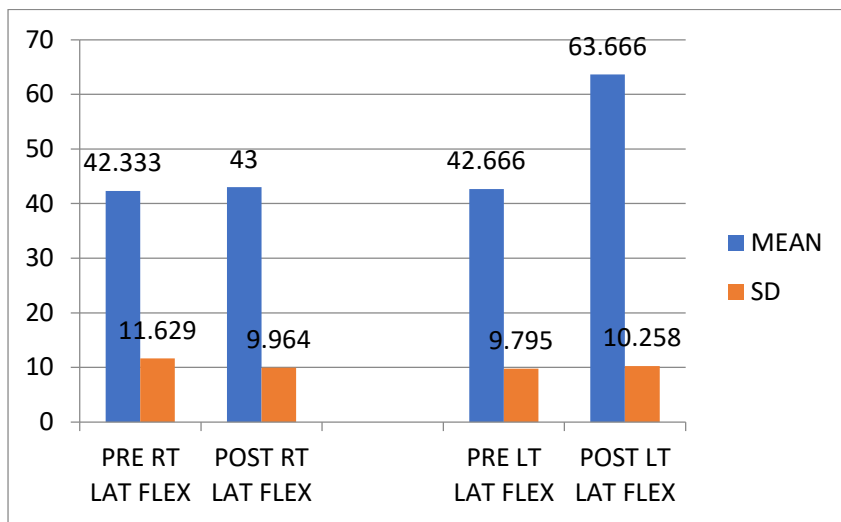


Interpretation: There is no significant difference between the mean of pre treatment cx extension and post treatment cx extension

Table No 6-Pre and post lateral flexion in trapezitis with subacute pain

	PRE EPSILATERAL LAT FLEX	POST EPSILATERAL LAT FLEX	P-value	PRE CONTRA LATERAL LAT FLEX	POST CONTRA LATERAL LAT FLEX	P-value
MEAN	42.333	43	0.029	42.666	63.666	0.3343
SD	11.629	9.964		9.795	10.258	

Graph No 6- Pre and post lateral flexion in trapezitis with subacute pain



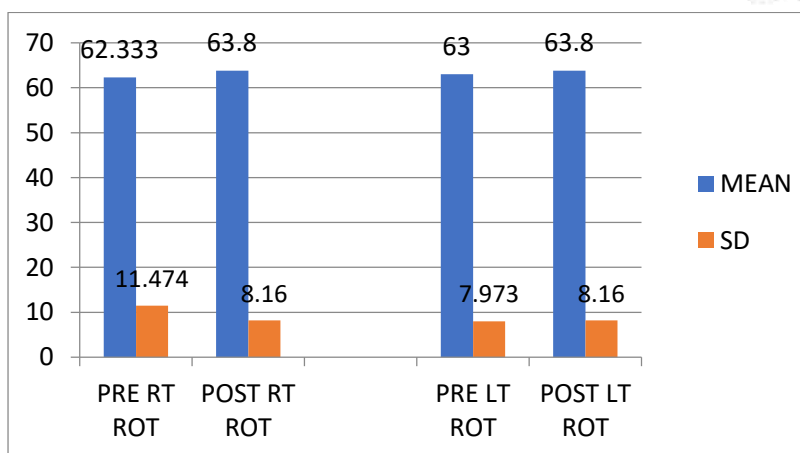
Interpretation: There is no significant difference between the mean of pre Ipsilateral lateral flexion and post Ipsilateral lateral flexion.

There is significant difference between the mean of pre Contralateral lateral flexion and post Contralateral lateral flexion .

Table No 7-Pre and post cx rotation in trapezitis with subacute pain

	PRE EPSILATER AL ROT	POST EPSILATER AL ROT	P-value	PRE CONTRA LATERAL ROT	POST CONTRA LATERAL ROT	P-value
MEAN	62.333	63.8	0.0290	63	63.8	0.3343
SD	11.474	8.16		7.973	8.16	

Graph No 7- Pre and post cx rotation in trapezitis with subacute pain



Interpretation: There is no significant difference between the mean of pre cx rotation and post cx rotation.



#### IV. DISCUSSION

Trapezititis is defined as the inflammation of trapezius muscle leading to pain which is present even during rest and is aggravated by activity. [11] Trapezititis is a commonly seen condition due to overuse and faulty posture. It leads to myofascial trigger points and muscle spasm. It causes range of motion restriction of cervical spine, tenderness and neck pain. [12]

Iontophoresis, the process of increasing the penetration of drugs into surface tissues by the application of an electric current. [13] Diclofenac sodium (Voltaren) is a non-steroid anti-inflammatory agent of a new chemical structure, which in animal experiments shows a high degree of anti-inflammatory, analgesic, and antipyretic activity in various pharmacological models. [14] In a study done by Komali, Et al 2014 he stated that sodium diclofenac is more potent as an analgesic compared to Ibuprofen. [15]

This was an interventional study that evaluated females and males present with neck discomfort. The aim of the study was to see the effectiveness of IFT with iontophoresis in the management of trapezititis with subacute pain In order to give the best and most effective treatment to the subjects. The results of this study shows that IFT with iontophoresis reduces pain, reduces tenderness and improves the range of motion.

There is significant difference between the pre pain intensity and post pain intensity in trapezititis with subacute pain by using ift with sodium diclofenac according to this the pain was reduced by 'Pain gate theory', proposed by Melzack and wall Briefly, this theory proposes that action potentials travelling in large-diameter myelinated afferent nerves from cutaneous receptors compete for access to the central ascending sensory tracts in the dorsal horn of the spinal cord with those of small-diameter unmyelinated sensory fibres carrying pain information. Activating in the large fibres takes precedence over that in small fibres, 'closing the gate' to pain information entering the central nervous system and preventing it from reaching a conscious level. Pain is thus reduced. Large-diameter myelinated fibres are stimulated optimally at 100Hz, and clinical experience indicates that interferential therapy at this frequency reduces pain markedly, especially when applied to acupuncture points. [6] Jorge P. Fuentes Et al 2010 stated in the study that Interferential current therapy included in a multimodal treatment plan seems to produce a pain-relieving effect in acute and chronic musculoskeletal painful conditions compared with no treatment or placebo. [16] Nonsteroidal anti-inflammatory drugs (NSAIDs) have anti-inflammatory effects, due to the inhibiting of cyclooxygenase, the rate-limiting enzyme in the conversion of arachidonic acid to inflammatory mediators, such as prostaglandins, thromboxanes, and prostacyclins. They also inhibit the sensitization of peripheral pain neurons through blocking production of the same mediators, especially prostaglandin E2. [17] Lin Fen Hsieh MD Et al 2010 concluded in double-blind, randomized, placebo-controlled study of myofascial pain of the upper trapezius demonstrates that diclofenac sodium patch was superior to placebo in terms of reducing VAS scores and improving functional outcomes, and did not cause significant adverse effects. [18]

There is significant difference between the mean of pre Contralateral lateral flexion and post Contralateral lateral flexion. According to this Sayed A. TANTAWY Et al 2020 stated In a study that, the IFC effects might be similar to transcutaneous electrical nerve stimulation (TENS) Furthermore, there are two possibilities to explain pain reduction; the release of endogenous opioids and the gate control theory. IFC stimulation penetrates deeper into the tissues, leading to significant and long-term pain reduction, and functional ability improvement on both subjective and objective parameters. which in turn reflected on the increased ROM. [19] Marry kamal nasif takla Et al 2018 stated In a study that contractions resulting may regulate endplate acetylcholine production and lower algogenic substances found throughout the MTrP area. Nonetheless, these muscle twitches will likely enhance local blood flow of this area, resulting in a "washout" of these inflammatory chemical mediators and increase muscle oxygenation, consequently aiding a mechanical relaxation of the MTrP taut band. These therapeutic effects could have possibly aided in the greater increase of PPT and active cervical lateral flexion. [20]

In this present study it was found that statistically There was no significant difference between the Cx flexion, cx extension, cx rotation and Ipsilateral cx lateral flexion as p-value was  $>0.05$ . Abulkhair Beatti Et al 2010 stated in a study that There were no changes in ROM with IFT with clinical pain. However, other factors other than pain may have limited ROM as a consequence of muscle damage, namely muscle shortening, swelling and loss of strength decrease ROM. but clinically mild difference in ranges after the treatment was seen. [21]

Based on the obtained results, it is thought that IFC with sodium diclofenac seems to reduce pain, tenderness and improve range of motion. There was an immediate effect in the experimental model used.

## V. CONCLUSION

The study thereby concludes that sodium diclofenac with Interferential therapy is effective for improving pain and range of motion.

## VI. LIMITAION OF THE STUDY

Only immediate effect was seen.

## VII. FUTURE SCOPE OF THE STUDY

The study shows immediate effect , but a long term protocol can be conducted further.

The study conducted on patients with subacute pain but on patients with chronic pain can be conducted further.

The study can be conducted for any other age group.

The study can be use with any other physiotherapy treatment for a comparative study.

## VIII. CLINICAL IMPLICATION

Since the study concludes that interferential therapy with sodium diclofenac significantly improves the pain and range of motion, Hence it can be used along with conventional therapy in clinical practice on patients with trapezitis.

## IX. ACKNOWLEDGEMENT

I express my deep sense of gratitude to my project guide Dr. Gargi Bhalekar, professor of Neuro Physiotherapy department at LSFPEF's College of Physiotherapy, for her guidance, precious time and contributions made during the course of the study. I express my sincere thanks to all the subjects who participated and gave their full cooperation for the study.

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