



MANUSCRIPT HIMANSHU INTERNSHIP PROJECT

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Abstract - The ends of bones are covered with protective tissue called cartilage. Cartilage is a tough, rubbery substance that's flexible and softer than bone. Its job is to protect the ends of bones within a joint and allow them to move easily against each other. When cartilage breaks down, these bone surfaces become pitted and rough. This can cause pain within the joint, and irritation in surrounding tissues. Damaged cartilage can't repair itself. This is because cartilage doesn't contain any blood vessels. When cartilage wears away completely, the cushioning buffer that it provides disappears, allowing for bone-on-bone contact. This can cause intense pain and other symptoms associated with OA.(1)

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INTRODUCTION

OA occurs most often in older people, although it can occur in adults of any age. OA is also called degenerative joint disease, degenerative arthritis, and wear-and-tear arthritis.

The ends of bones are covered with protective tissue called cartilage. Cartilage is a tough, rubbery substance that's flexible and softer than bone. Its job is to protect the ends of bones within a joint and allow them to move easily against each other. When cartilage breaks down, these bone surfaces become pitted and rough. This can cause pain within the joint, and irritation in surrounding tissues. Damaged cartilage can't repair itself. This is because cartilage doesn't contain any blood vessels. When cartilage wears away completely, the cushioning buffer that it provides disappears, allowing for bone-on-bone contact. This can cause intense pain and other symptoms associated with OA.(1)

The most common symptoms include:

- Pain
- Tenderness (discomfort when pressing on the area with your fingers)
- Stiffness
- Inflammation

The type of treatment that will help be the most effective will largely be determined by the severity of your symptoms and their location. Often, lifestyle changes, over-the-counter (OTC) medication, and home remedies will be enough to provide you with relief from pain, stiffness, and swelling. (1)

Surgical management is required when the joint space between bones is dramatically reduced—the cartilage is almost completely gone, leaving the joint stiff and possibly immobile. The synovial fluid is decreased dramatically, and it no longer helps reduce the friction among the moving parts of a joint. Procedures use are Osteotomy and knee replacement surgery. (1) Realignment surgery, or osteotomy, is one option for people with severe OA of the knee. During this surgery, a surgeon cuts the bone above or below the knee to shorten it, lengthen it, or change its alignment. This surgery shifts the weight of your body away from the points of the bone where the greatest bone spur growth and bone damage has occurred. This surgery is often done in younger patients. Total knee replacement, or arthroplasty, is a last resort for most patients with severe OA of the knee. During this procedure, a surgeon removes the damaged joint and replaces it with a plastic and metal device. This helps improve the patients quality of life. Medical treatment is also used in the patients which include oral analgesics, NSAIDS and Corticosteroids. (1)

Nonsurgical management could also be an important initiative to stop disability and maintain quality of life within the growing number of individuals with knee OA. The four pillars of practice of massage, exercise and movement, electrotherapy and kindred methods of treatment is included in physiotherapy which is defined by Royal chartered society. 1) The symptoms and signs which are related to defective integrity of articular cartilage additionally to relative changes within the underlying bone and at the joint margins results in O.A . A clinical syndrome of symptoms which regularly includes pain may evolve from poorly innervated articular cartilage defects. The presence of knee pain has been shown to correlate with MRI findings of moderate to larger effusions also as synovial thickening. pain arising from tissue damage is classified as acute pain. it's provoked by a selected disease or injury, serves a useful biological purpose and is claimed to striated muscle spasm and sympathetic system activation. it's self-limited. Chronic pain in contrast could even be considered a disease state. (2) The precise etiopathogenesis of knee OA has yet to be defined but many predisposing factors, like genetic, metabolic, and mechanic disturbances could attribute to its development .Thus an absolute cure for OA isn't available. A symptomatic approach is widely utilized in conjunction with a variety of treatment options. management of painful symptoms and improvement of functional capacity are the treatment goals. These goals are achieved by combining non-pharmacologic modalities, like exercise programs, physiotherapy modalities and pharmacologic interventions. (3) IFT could even be a popular treatment for pain and dysfunction related to musculoskeletal conditions. Interferential electrotherapy with amplitude modulated at low frequencies reaches deep muscles and nerves, stimulates voluntary muscles, promotes a rise in peripheral blood flow, accelerates bone healing, and reduces pain. the stimulation of giant diameter afferent fibers that inhibit the doorway of algid stimuli into the posterior horn of the medulla through small diameter afferent fibers there is evidence that IFT may inhibit the nociceptive stimulus. (3) The basic concept behind IFC is that skin impedance (resistance) is inversely

proportional to the frequency of an applied current therefore there's less skin resistance to a frequency of 2000Hz than to a frequency of

200Hz.5,12 it's been claimed that IFC are often wont to treat deeper tissues because lower pulse amplitude is required to beat the associated skin resistance. the two medium-frequency currents “interfere” within the tissues and produce an amplitudemodulated beat frequency, which is calculated because the difference between the values of the two currents applied. When two MF currents of slightly different frequencies are acknowledged such they cross each other by modulation of amplitude, a resultant low frequency is produced which is supposed to be the difference between the two medium frequencies. This resultant low frequency is known as beat frequency IFCs are used clinically since the 1950s, and its main clinical indications include pain management, reduction of swelling. (3) Osteoarthritis (OA) could also be a chronic degenerative joint disorder having an enormous economic impact on our health system worldwide. it's highly prevalent generally population and is increasing in frequency with age. Pain, disability and deterioration within the standard of life are the foremost consequences of the disease. Knee OA may progress from a dynamic process of injury and repair to irreversible joint damage requiring joint replacement to treat the unrelenting pain and/or significant disability. (4) Different types of electrode used are Vacuum, rubber plate and pen electrodes. Plate electrodes are made up of conducting rubber which are comfortable and long lasting. rubber plate and pen electrodes. Plate electrodes are made up of conducting rubber which are comfortable and long lasting. Vacuum electrodes made from a vacuum unit plug into rubber suction cup connected to a machine capable of producing vacuum. Wet sponges are placed within the cups and moisten the edges of the cups for better adherence, excellent for treating flat and smooth areas as an example back and knee. (5) IFT could also be a kind of electrical stimulation produced using the principle of AM where by two MF currents , which are slightly out of phase, are mixed to provide a coffee frequency current (0-25Hz).(6)

NEED FOR THE STUDY-

Somehow with evolving time, electro physical agents are becoming extinct quoting insufficient or low level evidences. But the very fact is that patients now a days seek nondrug alternatives for pain relief. As the population ages and at an equivalent time is becoming increasingly heavier, the prevalence of knee OA and therefore the associated economic and private burden are expected to rise. Nonsurgical management is a crucial initiative to stop disability and maintain quality of life within the growing number of individuals with knee OA. IFT may be a popular treatment for pain and dysfunction associated with musculoskeletal conditions. Interferential electrotherapy with amplitude modulated at low frequencies reaches deep muscles and nerves, stimulates voluntary muscles, promotes an increase in peripheral blood flow, accelerates bone healing, and reduces pain. Hence improved electro-physical agents trial design quality opens for brand spanking new and more robust conclusions. Therefore this study has been undertaken to evaluate the effect of different electrode types of IFT in patients with OA knee pain.

OBJECTIVE OF THE STUDY: -

- To analyze the efficacy of different electrode types of IFT in the treatment of patients with O.A knee with NRS as outcome measure.

REVIEW OF LITERATURE

1) Tuncay F, Kocak F, et al (2019) did a Comparison study on the efficacy of different electrode types of Interferential Current Therapy in the treatment of patients with chronic low back pain: A randomized controlled single-blinded study. One hundred patients with low back pain were randomized into three groups. Group 1 was given IFT with vacuum electrodes, group 2 was given IFT with carbon silicon pad electrodes and group 3 no IFT therapy was given. Patients were evaluated three times: before treatment, one week after and 12 weeks after treatment. Pain was assessed using VAS, disability with the ODI. Group 1 and 2 demonstrated a significant reduction of pain, disability and QOL scores as compared with pretreatment. In group 3 there was no significant improvement of VAS, ODI, QOL Scores. Inter group analysis demonstrated that the greatest analgesics and functional effects was recorded in group 1, which were significantly better results than in group 2. They concluded treatment using IFT with vacuum electrodes resulted in a significantly greater reduction in VAS, ODI scores than using IFT with carbon silicon pad electrodes in patients with LBP.

2) Shah N, Sheth M, (2017) et al did a study on Role of Interferential Therapy in Osteoarthritis Knee. They included two case study, one patient 45yr old housewife with complaint of knee pain 5 on VAS and other 58yr old person in government office with complaint of knee pain 7 on VAS. Both patients were given interferential therapy with vacuum electrode by using four pole vector technique with frequency of 0-100hz for 15mins. After the therapy session the pain on VAS of both the patients and reduced signifying that interferential current therapy has effect on knee pain. Therefore they concluded that it is the time to revisit electro-physical agents and to reassert their value as one of the pillars of Physiotherapy.

3) Bodhale A, Bedekar N, et al (2015) did a study on Comparison of Effects of Interferential Therapy (IFT) And Combination Therapy (IFT + Ultrasound Therapy) on Pain, Range of Motion and performance in Patients with Osteoarthritis of Knee. They included 60 patients with knee pain and divided them into two groups each of 30 patients. Group A was given combination of interferential current therapy and Ultrasound and the Group B was given only interferential current therapy. After the sessions they found that patients with combination therapy had significant change in pain and activity as compared to the group received only interferential therapy. They concluded that combination of IFT and U.S will be more effective in treatment of OA knee pain.

4) Buenaente ML D, Gonzalez-Suarez CB, et al (2014) did a Evidence based study on the effectiveness of interferential current therapy in the treatment of knee osteoarthritis: A meta-analysis. Pain relief and improving physical function such as activities of daily living and reducing intake of analgesics, such as Paracetamol was evaluated by using IFT O.A knee patients in this study. They included two groups in the study one intervention group which underwent interferential current therapy and the other control group which underwent analgesic treatment. After the treatment session they concluded that there was a significant effect of interferential current

therapy on reduction of pain in NRS and improved physical activity than those only consuming analgesic treatment.

5)Haefeli M, Elfering A, et al (2006) did a study on Pain Assessment. Pain intensity, pain related consuming analgesic treatment. 5)Haefeli M, Elfering A, et al (2006) did a study on Pain Assessment. Pain intensity, pain related disability, pain duration and pain affect are the aspects that outline pain and its effects. For each of these aspects different assessment instruments exist and are discussed in terms of advantages and disadvantages. They concluded that the NRS have some restriction while using these tools in elderly patients at the same it is the most easiest method to assess the pain even in illiterate patients.

6) Felson DT, Naimark A, et al (1987) did a study on The prevalence of knee osteoarthritis in the elderly. The study included patients with knee pain for more than 2yrs. This evaluation consisted of medical history, a physical examination of the knee, and a radiograph of the knees. The study showed prevalence of osteoarthritis of the knee increases with age among the persons over age 65yrs and occurs for both radiographic and symptomatic evidence of disease. The study has also shown that women are more likely to have symptomatic OA of the knee.

METHODOLOGY

The data was collected from the outpatients of Orthopedic depart of Dr. A.P.J Abdul Kalam , COPT , Loni ,Maharashtra state of India.

Source of Data: Out Patients of Musculoskeletal depart of Dr. A.P.J Abdul Kalam, College of Physiotherapy, Loni Maharashtra State, India. It was collected by the principal investigator himself. It was an experimental study of total 30 patients which included both male and female patients with O.A knee who were willing to participate in the study. Convenient sampling method was used. The study was done for over 4- 6 months . Equipment used in the study was INTERFEERENTIAL THERAPY and **NUMERICAL RATING SCALE.**

Materials to be used for study:

- IFT machine: Vacuum and Rubber pad electrodes
- Treatment Bed
- Consent Form
- Pencil and Pen
- Paper
- Water
- Ultrasonic gel.
- Micropore tape

SELECTION CRITERIA:**Inclusion criteria**

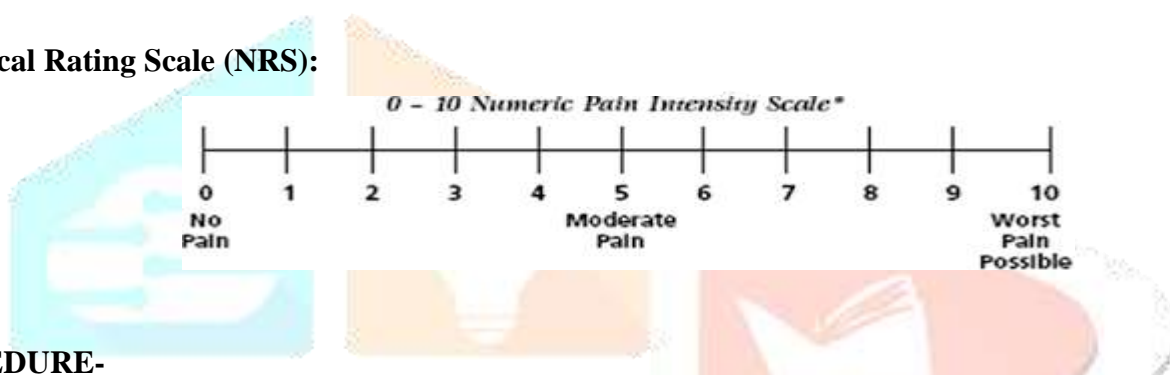
- Age 40-60 years
- Both male and female participants
- Patients with Osteoarthritic knee pain
- Patients willing to Participate

Exclusion criteria-

- Any abnormal skin sensitivity or infection.
- Patients with cardiac pacemakers.

Outcome Measures:

- Numerical Rating Scale

Numerical Rating Scale (NRS):**PROCEDURE-**

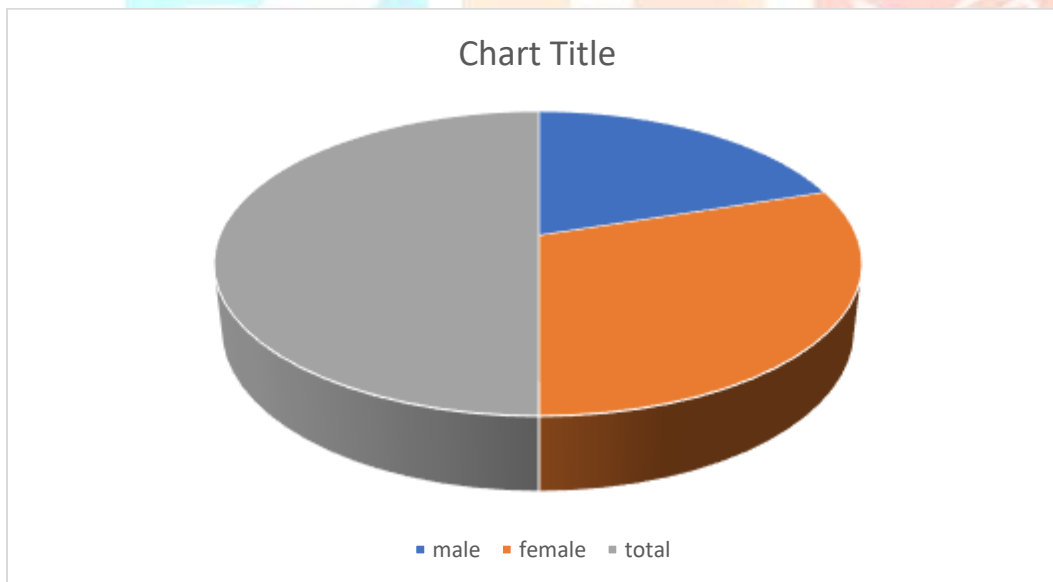
During the study there will be a set-up of IFT modality with Vacuum and Rubber plate electrodes. Total 30 Patients of age group between 40-60yrs both males and females who have Osteoarthritic knee pain with NRS more than 5, and who are willing to participate from Musculoskeletal out-patient depart of Dr A.P.J Abdul Kalam COPT will be selected. The patients will be given a comfortable position on a bed. Before the study patients will get a brief details about the procedure that would be performed on them. They will be tested for knee pain with Visual Analogue Scale and Numerical Rating Scale. The patients will be divided in two groups each of 15. One group (Group 1) of patients will be given Interferential therapy with Vacuum electrodes and the other group (Group 2) will be given Interferential therapy with Rubber pad electrodes. Group 1 will undergo IFT with vacuum electrodes in which four electrodes will be placed using four pole vector technique keeping the knee joint in middle at frequency of 50-100hz for 10mins. The sponges will be wetted with tap water and placed in the electrode cups. The cups of the vacuum electrode will be slightly squeezed, brought into contact with skin, and hold for few seconds until suction occurs. Group 2 will undergo IFT with rubber pad electrodes in which four pad electrodes will be placed using four pole vector technique keeping the knee joint in middle at frequency of 50-100hz for 10mins. Patients will undergo 12 sessions, 3 times per week for a period of 4 weeks. After completing the 12 sessions, the patients will be reassessed for knee pain using the NRS. Then whether there is any significant effect of IFT with vacuum or IFT with rubber pad electrodes on osteoarthritic knee pain with NRS will be concluded.

Results:

- The result of the present study was calculated by applying student's 't' test.
- The pre and post mean of IFT with vacuum electrode was calculated with the student's paired 't' test in which the p-value was 0.001 and t-value was 14.270.
- The pre and post mean of IFT with plate electrode was calculated with the student's paired 't' test in which the p-value was 0.001 and t-value was 6.859.
- There was significant difference seen in the scores of pain with use of different electrode in IFT in patients with O.A knee measured by NRS scale. The IFT with vacuum electrode showed more significant difference in knee pain as compared to IFT with plate electrode.

DATA ANALYSIS**Table 1: Gender Wise distribution of participants**

Male	12
Female	18
Total	30

**Figure 1: Gender wise distribution of Patients****Table 2 : Comparision of pre and Post Mean of IFT with Vaccum electrode**

	Mean+-SD	p value	t value
Pre	5.400+-1.724	0.001	14.270
Post	2.733+-1.580		

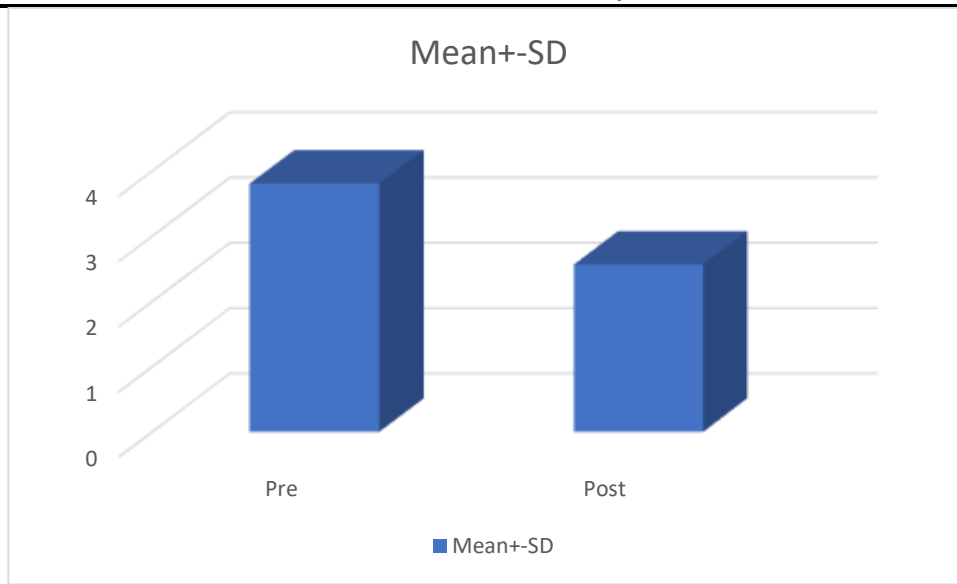


Figure 2 : Comparision of pre and post mean of IFT with vacuum electrode

Table 3: Comparison of Pre and Post Mean of IFT with Plate electrodes

	Mean+-SD	p value	t value
Pre	5.000+-1.195	0.001	6.859
Post	3.867+-1.302		

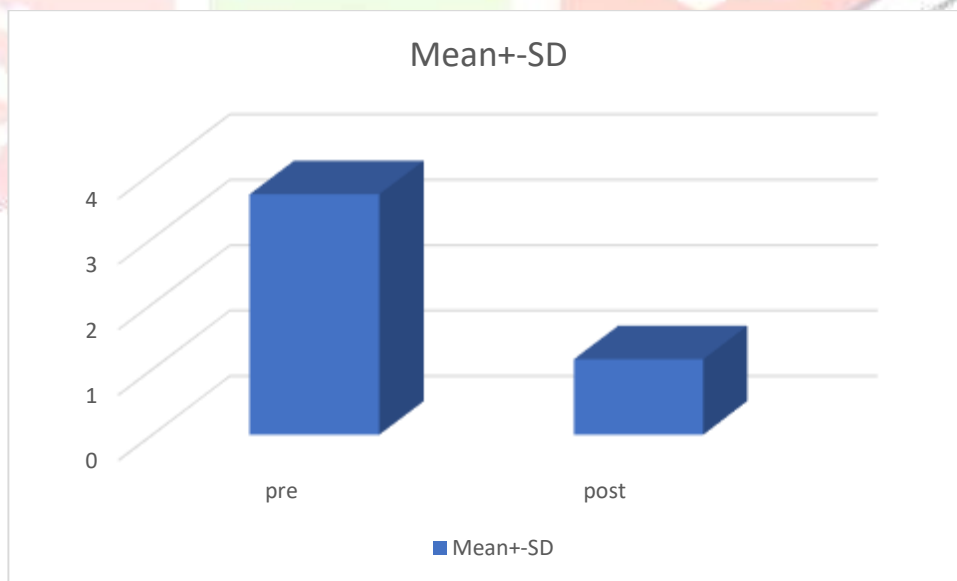


Figure 3: Comparision of pre and post Mean of IFT with plate electrode

Table 4 : Comparison of IFT with Vacuum electrode and IFT with plate electrode

	Mean Difference
IFT with Vacuum electrode	2.667
IFT with plate electrode	1.133

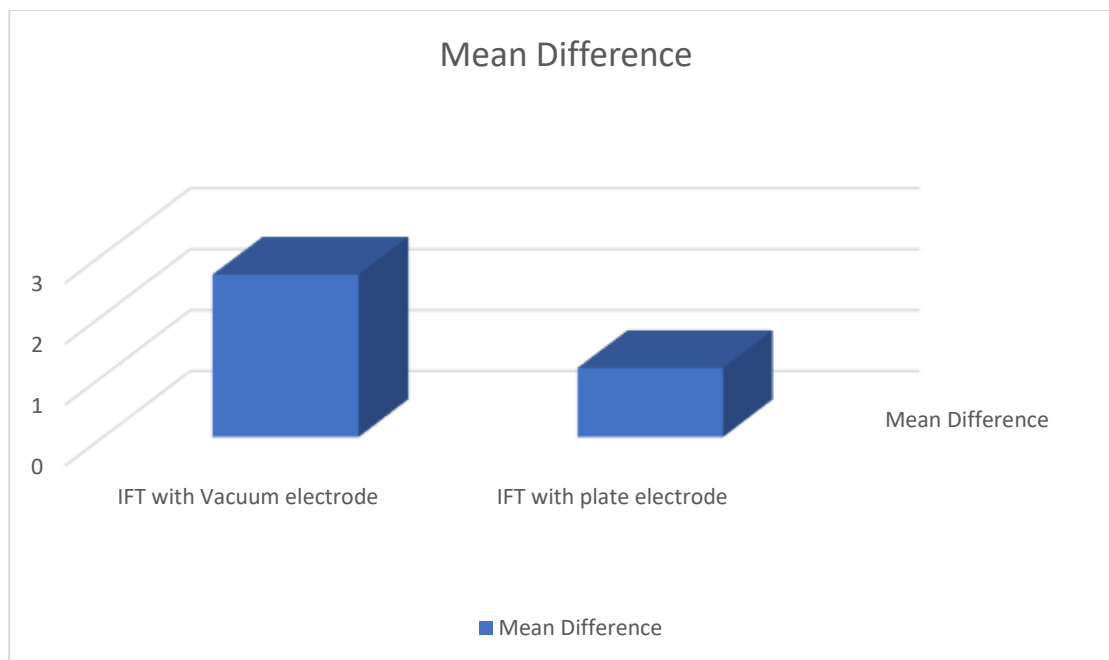


Figure 4: Comparison of IFT with Vacuum electrode and plate electrode

Discussion :

The study was carried out to evaluate the efficacy of different electrode types of IFT on pain in patients with O.A knee. There was significant improvement seen in knee pain measured by NRS. But there was more significant improvement seen in knee pain with IFT with vacuum electrode as compared to IFT with plate electrode. IFT with vacuum electrode provides more secure placement of the electrodes because of the suction pressure. Wet sponges and moisten the edges of the cups provide better adherence and are excellent for treating flat and smooth areas. The suction pressure with vacuum electrode provides additional advantage in stimulating the soft tissue. Thus the study proves that the use of IFT with vacuum electrode has a significant effect on knee pain in patients with O.A knee.

This supports the study carried out by Tuncay F, et al showing Comparison study on the efficacy of different electrode types of Interferential Current Therapy in the treatment of patients with chronic low back pain.

Tuncay F. et al in the study included hundred patients with low back pain. The patients were divided into three groups. Group 1 received IFT with vacuum electrode, group 2 received IFT with silicon pad electrode and group 3 received no IFT therapy for twelve weeks and the pain was assessed using VAS. They concluded that IFT with vacuum electrode resulted in significant greater and clinical reduction in VAS than using IFT with carbon pad electrodes in patients with LBP.

Shah N. et al did a study on role of Interferential therapy in O.A knee. Their study showed both positive and negative findings of the effects of interferential therapy in osteoarthritis knee. They concluded that it is the time to revisit electrophysical agents and to reassert their value as one of the pillars of physiotherapy.

Bodhale A. et al did a study on Comparison of Effects of Interferential Therapy (IFT) And Combination Therapy (IFT + Ultrasound Therapy) on Pain, Range of Motion and Function in Patients with Osteoarthritis of Knee. They concluded that by combining the two treatments modalities, none of the individual effects of the treatments are lost, but the benefit is that the lower treatment intensities can be used to achieve the same results and there are additional potential benefits in terms of outcome measure.

Buenavente ML D. et al did a Evidence based study on the effectiveness of interferential current therapy in the treatment of knee osteoarthritis. Online database search was done for randomized controlled trials comparing IFC against the control or sham IFC in knee OA. They concluded that IFC is effective in reducing pain and likewise decreasing paracetamol intake in patients with knee OA. It is best to combine IFC with exercise in managing pain, reducing intake of pain medication and improving function in patients with knee OA.

Felson DT. et al did a study on The prevalence of knee osteoarthritis in the elderly. The study concluded that there is significant higher prevalence of radiographic changes of OA in women than in men and even shows the prevalence of OA knee increasing with the age.

Conclusion:

The present study concludes that IFT with vacuum electrode helps in reduction of knee pain in patients with O.A knee. Hence this study accepts the alternate hypothesis and rejects null hypothesis.

Limitation of study:

- The study group size was small
- There are chances of errors by patient.

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