



## CASE REPORT

# Osteoarthritis- Pilot Study

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### Abstract

**Background:** The aim of this study is to know the effectiveness of the combination of hot pack, interferential current therapy (ICT) and ultrasound with some quadriceps isometric exercises in the patients having knee osteoarthritis.

**Methods:** This study includes 3 patients of knee osteoarthritis of different-different ages. All patients were given the same treatment as hot pack, interferential current therapy (ICT) and ultrasound with some quadriceps isometric exercises like quad set, ham set and full arc terminal extension. And WOMAC scale is also used to rate their difficulty levels.

**Result:** Improvement is seen in all the patients and this treatment seems to be effective as this combination reduces pain, swelling, stiffness at knee joint and it also increase the range at knee. Patients reported on WOMAC scale which shows improvement in their basic activities.

**Conclusion:** This combination of hot pack, interferential current therapy (ICT) and ultrasound with some exercises is very effective for knee osteoarthritis as there is no permanent cure for this condition.

**Keywords:** Knee Osteoarthritis, ICT, Ultrasound, Hotpack, WOMAC, Pain, Stiffness, ABBREVIATIONS: OA - Osteoarthritis, TENS - Transcutaneous Electrical Nerve Stimulation, ICT - Interferential Current Therapy, SWD - Short Wave Diathermy, LLLT - Low Level Laser Therapy, WOMAC - Western Ontario and McMaster Universities Arthritis Index, VAS - Visual Analogue Scale.

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## 1 | INTRODUCTION

**O**steoarthritis (OA) is a chronic disease of articular cartilage, associated with secondary

changes in the underlying bone, causing joint inflammation and degeneration<sup>(1)</sup>. OA is the commonest joint disease of adult worldwide<sup>(2)</sup>. Its incidence rises with age. Primarily affects the large,

weight-bearing joints such as the knee and hip, resulting in pain, loss of movement and loss of normal function.

Knee Osteoarthritis is the most common type of OA occurring in the adults of 45-50 years of age. Knee osteoarthritis in men aged 60 to 64 is more commonly found in the right knee than in the left knee, while its distribution seems to be more evenly balanced in women <sup>(3)</sup>. OA of the knee is a multifactorial disease, whose etiology includes generalized systemic disease (e.g., gout, rheumatoid arthritis), constitutional factors (e.g., age, gender and genetics) and also biomechanical factors (e.g., joint damage, muscle weakness, overweight and obesity) <sup>[4], (4)</sup>. There are some risk factors due to which the chances of knee osteoarthritis increases such as previous knee trauma increases the risk of osteoarthritis of the knee by 3.86 times. Old age, female, overweight and obesity, repetitive use of joints, bone density, muscle weakness, and joint relaxation all play an important role in the development of knee OA

There are some common features of knee osteoarthritis such as pain in knee joint, swelling in knee, stiffness, muscle spasm, restricted movements at knee, and deformity of tibia and quadriceps atrophy <sup>(5)</sup>. There are some radiological tests used for diagnosis of knee OA. For example, X- ray shows some changes in knee joint such as osteophyte formation, narrowing of joint space, cartilage erosion, deformity of the joint and subluxation in advance cases. <sup>(6)</sup>

Knee osteoarthritis can be manage by non-pharmacologically by weight loss and exercises as physiotherapy treatment always target to relieve pain, improve function, mobility, joint function, quality of life, stabilize knee, prevent deformity, reduce load on knee joint and slow the development of disease <sup>(7)</sup>. Recent studies suggest that exercise is essential for knee osteoarthritis treatment program. It

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is also suggested that engaging in moderate physical activity at least three times per week can reduce the risk of arthritis-related disability by 47% <sup>(8)</sup>.

After 8 week intervention, exercise therapy was found to significantly reduce pain and improved function and quality of life. After treatment, this improvement sustained for 2 to 6 months. Exercises given for the management of knee osteoarthritis aimed to Increase quadriceps strength, flexibility. With all these, electrotherapy modalities like transcutaneous electrical nerve stimulation (TENS), short wave diathermy (SWD), interferential current therapy (ICT) and photobiomodulation (PHOTO) can be used to reduce pain, improve function and increase quadriceps strength <sup>11</sup>. Passive resources, also known as first line treatment, can also be used in the management of knee osteoarthritis individuals.

## 2 | METHODOLOGY

This case trial was conducted with two patients suffering from knee osteoarthritis with constant pain, restricted range of motion, and the research team aimed to evaluate the effectiveness of modalities and exercises as a treatment procedure to treat pain and increase joint mobility. The patients considered in this study were included if Clinical signs of OA were present along with diagnosis of pain in knee, swelling in knee joint, restricted movements at knee, impairment in activities of daily living. The subjects were excluded in individuals with pacemaker, metallic implants, pregnancy and lactating women, infection.

**Study Design:** This study is a pilot case study in which 3 patients are included. The sampling is convenient sampling. The data collection has been done by visiting hospital where patient came with their chief complaints.

**Subject A** – A female of 54 years old used to work in NGO came to our hospital with the complain of severe pain and slight swelling in both the knees and difficulty in walking. She was having pain since last 4 months and she used to take painkillers and also applied oil on knee to reduce the pain for some time. She also applied hot pack on knees at home. The pain



**FIGURE 1.1:** swelling in both the knees

in the knee showed a visual analogue scale (VAS) of 6. She

Had X-rays of both knees and osteoarthritis was detected in it. The pain was aggravated while walking and bending the knees. She was given with hot pack for 10 minutes first followed by interferential current therapy (ICT) for 12 minutes then ultrasound for 4 minutes. After that she was given with some quadriceps isometric exercises like quad set, hams set and full arc terminal extension 10 repetitions with 5 seconds hold and 5 seconds relax, 3 to 5 times a day.

**Subject B** – A female of 62 years old came to our hospital with pain and swelling in right knee. She was having pain since last 9 months. She used to take painkillers and applied some oil on knee. The pain was aggravated while walking and there is a sound of crepitus when sitting up and down. The pain in the knee showed a visual analogue scale (VAS) of 7. She had X-rays of right knee done by her 4 days ago and osteoarthritis was detected in it.

She was given with hot pack for 10 minutes first followed by interferential current therapy (ICT) for 12 minutes then ultrasound for 4 minutes. After that she was given with some quadriceps isometric exercises like quad set, ham set and full arc terminal extension 10 repetitions with 5 seconds hold and 5 seconds relax, 3 to 5 times a day.

**Subject C** – A male of 76 years old came to our hospital with a severe pain and loss of movements at both the knees. He was having pain for the last 6 months and used to take painkillers and applied some

ointment to reduce pain. He had X-rays of both knees and osteoarthritis was detected in it. He had received physiotherapy treatment once at another hospital for 10 days. Thereafter, there was a slight decrease in pain and swelling. But after 12 days from the previous treatment the pain increased at knees. The pain was aggravated while walking and swelling at ankle while high sitting on bed. But placing a pillow or any object under ankle reduces pain. But when he came to our hospital for physiotherapy management, the pain in the knee showed a visual analogue scale (VAS) of 7. He was given with hot pack for 10 minutes followed by interferential current therapy (ICT) for 12 minutes then ultrasound for 4 minutes. After that he was given with some quadriceps isometric exercises like quad set, ham set and full arc terminal extension 10 repetitions with 5 seconds hold and 5 seconds relax, 3 to 5 times a day

### 3 | RESULTS

The WOMAC (Western Ontario and McMaster Universities Arthritis Index) is used for the assessment of hip and knee osteoarthritis. This scale is being used for many years<sup>14</sup>. The WOMAC includes 24 questions and 3 sub-scales i.e. 5 for pain, 2 for stiffness and 17 for physical function. Patients rate their difficulty levels e.g. pain while walking or climbing stairs, stiffness in morning or night and physical function on standing or bending etc.



In this, WOMAC uses 5 options for all 3 sub-scales for patients to rate their difficulty level in terms of none, mild, moderate, severe and extreme. These readings are recorded by the patient before the treatment on day one when they came to us with their chief complaints of pain and stiffness in their knee.

These are the footprints of Subject A on first day of treatment and in these prints stride length is 52cm, step length is 29cm and degree of toe out is 11° which more than the normal individual. But after the treatment, gait of this patient improved.

These are the footprints of Subject B on first day of treatment and in these prints stride length is 58cm, step length is 31cm and degree of toe out is 10° which more than the normal individual. But after the treatment, gait of this patient improved.

These are the footprints of Subject C on first day of treatment and in these prints stride length is 54cm, step length is 33cm and degree of toe out is 13° which more than the normal individual. But after the treatment, gait of this patient also improved.

Now, below are the readings recorded by the patient after the treatment on their last session when they came to us with reduction of pain and stiffness in their knee.

#### 4 | DISCUSSION

In these 3 cases, patients got the treatment for knee osteoarthritis. Hot pack, interferential current ther-

apy (ICT), ultrasound with some quadriceps isometric exercises like quad set, ham set and full arc terminal extension 10 repetitions with 5 seconds hold and 5 seconds relax, 3 to 5 times a day were given to all the 3 patients and this treatment seems to be effective as this combination of modalities and some exercises reduces pain, stiffness, swelling and improves range at knee. After the treatment at the last sessions, patient 1 reported visual analogue scale (VAS) as 2 and patient 2 reported VAS as 3 and patient 3 reported VAS as 2 which shows that there has been an improvement in patient's knee osteoarthritis. The results table also showed that there was an improvement in the day-to-day activities of all the three patients like in going up and down stairs, performing light domestic duties, putting on or taking off your socks or stockings etc. Thus, there is overall improvement in patients quality of life.

In review of literature, there are some treatment and combination of techniques which can also be beneficial in knee osteoarthritis cases as exercise and education about weight loss reduces pain and improves the function at knee. But in another study it is said that interferential current therapy, shortwave therapy And photobiomodulation with some exercise are not much effective. The another combination can be low level laser therapy with some stretching can also be beneficial. But in another study it is stated that both high and low transcutaneous electrical nerve stimulation are not that much effective as they increases pressure pain threshold in patients having knee osteoarthritis. Another study said that yoga is

**TABLE 1:** WOMAC scale shows pain, stiffness and physical function for all the 3 patients before the treatment.

Serial No.	WOMAC	Subject A	Subject B	Subject C
	<b>PAIN</b>			
1	Walking on a flat surface	Mild	Moderate	Mild
2	Going up and down stairs	Severe	Severe	Moderate
3	At night while in bed, pain disturbs your sleep	Mild	Mild	None
4	Sitting or lying	Mild	Severe	Moderate
5	Standing upright	Moderate	Moderate	Moderate
	<b>STIFFNESS</b>			
6	Awakening in the morning	Mild	Mild	None
7	Sitting, lying or resting in the day	Mild	Moderate	Mild
	<b>PHYSICAL FUNCTION</b>			
8	Descending stairs	Moderate	Moderate	Moderate
9	Ascending stairs	Severe	Severe	Moderate
10	Rising from setting	Moderate	Severe	Moderate
11	Standing	Moderate	Severe	Mild
12	Bending to the floor	None	None	None
13	Walking on flat surface	Moderate	Severe	Moderate
14	Getting in and out of a car, or on or off a bus	Severe	Severe	Moderate
15	Going shopping	Mild	Severe	Severe
16	Putting on your socks or stockings	Severe	Severe	Moderate
17	Rising from the bed	Mild	Moderate	Moderate
18	Taking off your socks or stockings	Moderate	Severe	Moderate
19	Lying in bed	Mild	Mild	Moderate
20	Getting in or out of the bath	None	Mild	Moderate
21	Sitting	Mild	Severe	Moderate
22	Getting on or off the toilet	Moderate	Severe	Moderate
23	Performing heavy domestic duties	Severe	Severe	Moderate
24	Performing light domestic duties	Mild	Moderate	Mild



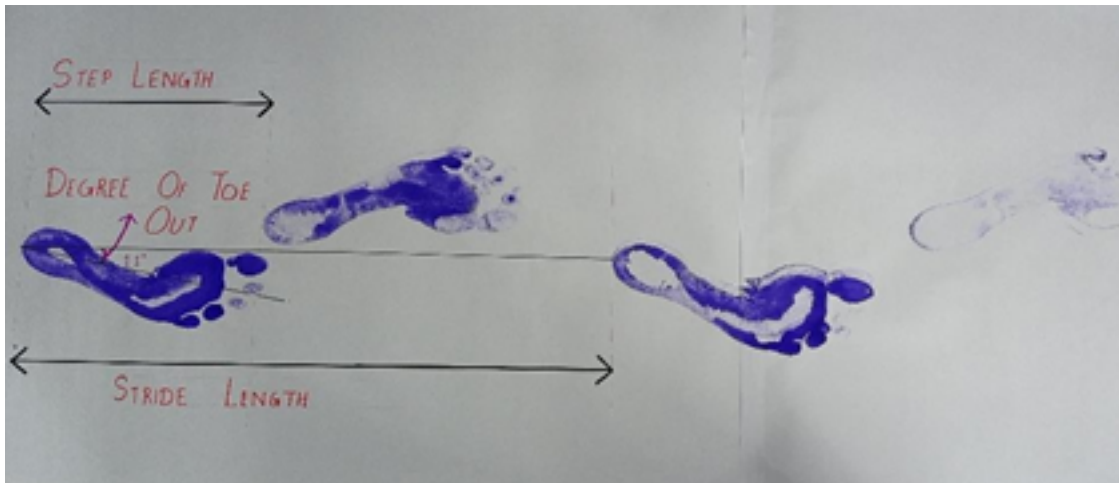


FIGURE 1.2: Foot print of Subject A



FIGURE 2.2: Footprint of Subject B

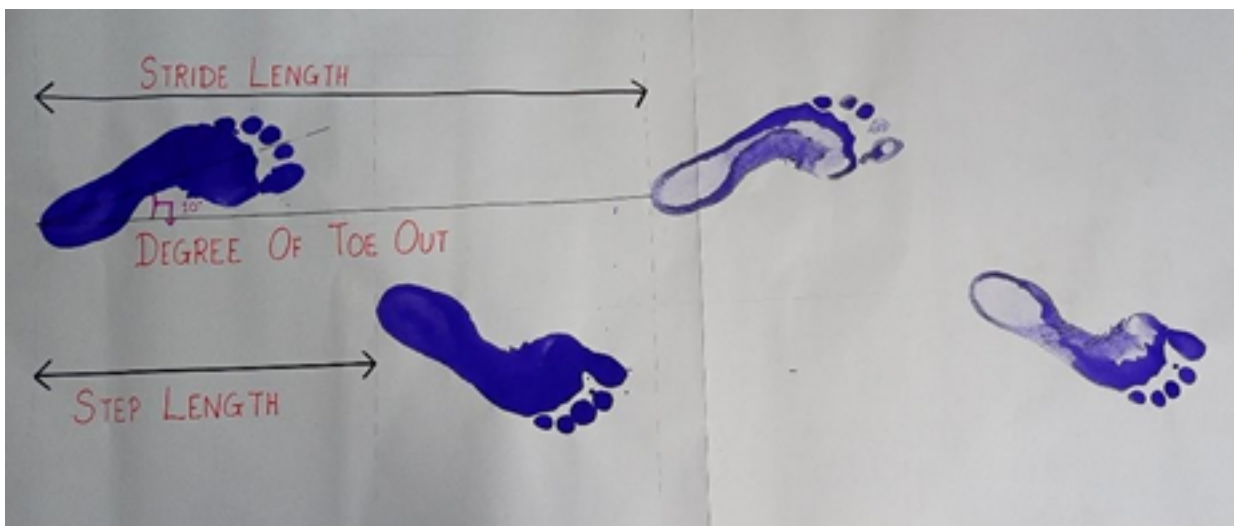


FIGURE 3.2: Footprint of Subject C

**TABLE 2:** WOMAC scale shows pain, stiffness and physical function for all the 3 patients after the treatment.

Serial No.	WOMAC	Subject A	Subject B	Subject C
	<b>PAIN</b>			
1	Walking on a flat surface	Mild	Mild	Mild
2	Going up and down stairs	Moderate	Moderate	Moderate
3	At night while in bed, pain disturbs your sleep	None	None	None
4	Sitting or lying	None	Moderate	Mild
5	Standing upright	Moderate	Mild	Mild
	<b>STIFFNESS</b>			
6	Awakening in the morning	Mild	Mild	None
7	Sitting, lying or resting in the day	None	Mild	None
	<b>PHYSICAL FUNCTION</b>			
8	Descending stairs	Moderate	Moderate	Moderate
9	Ascending stairs	Moderate	Moderate	Moderate
10	Rising from sittings	Mild	Moderate	Mild
11	Standing	Moderate	Mild	Mild
12	Bending to the floor	None	None	None
13	Walking on flat surface	Mild	Moderate	Mild
14	Getting in and out of a car, or on or off a bus	Moderate	Moderate	Moderate
15	Going shopping	Mild	Severe	Moderate
16	Putting on your socks on stockings	Moderate	Moderate	Moderate
17	Rising from the bed	Mild	Mild	Mild
18	Taking off your socks or stockings	Moderate	Moderate	Mild
19	Lying in bed	None	None	None
20	Getting in or out of the bath	None	Mild	Mild
21	Sitting	Mild	Mild	None
22	Getting on or off the toilet	Moderate	Moderate	Mild
23	Performing heavy domestic duties	Moderate	Severe	Moderate
24	Performing light domestic duties	Mild	Moderate	Mild

the safe for health and an effective treatment for knee osteoarthritis. So these treatments can also be given in knee osteoarthritic patients as it has been already researched and also confirmed to be effective in knee osteoarthritis cases.

## 5 | CONCLUSIONS

According to these 3 cases and review of literature, hot pack, interferential current therapy (ICT) and ultrasound with some quadriceps isometric exercises like quad set, ham set and full arc terminal extension seems to be very effective in knee osteoarthritic patients as this combination of electrotherapy modalities with some exercises improves the overall activities of daily living as it reduces pain, swelling, stiffness at knee joint and it also increase the range at knee. As it has been researched that there is no permanent cure for this condition so what can be done is treating the symptoms. And in this study it is proved that patient having knee osteoarthritis had improved as shown in WOMAC scale, as they reported improvement in almost all the activities so this combination can be effective treatment for knee osteoarthritis.

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