

Original Article

EFFECTS OF ULTRA REIZ CURRENT AND TENS ON PAIN AND FUNCTIONAL ABILITY IN OLDER PATIENTS WITH OSTEO ARTHRITIS KNEE

Siddhartha Sen ^{1*}, T.R. Nanda kumar ², S.S. Rau ³.

¹* Associate Professor, Department of physiotherapy, Sardar Bhagwan Singh (PG) Institute of Biomedical Sciences & Research, Dehradun, India.

² Assistant Professor, Department of physiotherapy, Dolphin Institute Of Biomedical & Natural Sciences, Dehradun, India.

³ Associate Professor, Department of physiotherapy, National Institute of Orthopaedically Handicapped, Kolkata, India.

ABSTRACT

Background and introduction: Osteoarthritis is a degenerative joint disease where Progressive destruction articular cartilage and formation of bone at the margin of the joint happens. This is extremely common condition It is evident that ultra reiz current is good analgesic and can improve circulation locally, but there is least work of ultra reiz on osteoarthritis. Ultra reiz current is more effective in comparison with tens in reducing pain and increasing functional ability of older adults with osteoarthritis knee. **Purpose of the study:** is To determine the effect of ultra reiz current on pain and functional ability of osteoarthritis knee and to determine the effects of ultra reiz current in comparison with TENS. **Methodology:** On the basis of inclusion and exclusion criteria subjects was screened and included in the study. Convenient sampling was done with random assignment to three treatment groups where Group-A (experimental) undertook ultra reiz current and exercise, Group-B (experimental) TENS and exercise, Group- C (control) only exercise. The outcome measure was pain & Functional ability and measured with WOMAC scale. The data was collected in pre intervention at the 1st week and post intervention at the 2nd week. **Result:** data was analyzed by using ANOVA and the result showed there is decrease in VAS score and improve in functional ability. **Conclusion:** The study concluded that Ultra reiz current and TENS show similar improvement in relieving pain and functional ability in comparison with TENS in older patients with osteoarthritis knee.

KEY WORDS: Ultra Reiz Current; TENS; Osteoarthritis; WOMAC Index.

Address for correspondence: Dr. Siddhartha Sen, Associate Professor, Department of physiotherapy, Sardar Bhagwan Singh (PG) Institute of Biomedical Sciences & Research, Dehradun, India.

Email: siddhartha.pt@gmail.com

Access this Article online

Quick Response code



International Journal of Physiotherapy and Research

ISSN 2321- 1822

www.ijmhr.org/ijpr.html

Received: 09 September 2013 Accepted: 25 September 2013

Peer Review: 09 September 2013 Published: 11 October 2013

INTRODUCTION

Osteoarthritis is a degenerative joint disease where progressive destruction of articular cartilage and formation of new bone at the margin of the joint occurs. This is a progressive disease of diarthrodial joints occurring at late in life and characterized pathologically by focal degeneration of articular cartilage, subchondral bone thickening and marginal osteochondral

outgrowth and joint deformity. Clinically it is occurring as an episode of pain, synovitis, with joint effusion, joint stiffness and progressive limitation of joint range of motion.^{1,20,21} Osteoarthritis is more prone to develop due to occupations requiring prolonged standing, sports injury, obesity^{2,3,4,5}, and prolonged overuse of any joint or group of joints. During 20th century, the only therapy available for the

many sufferers from OA has been pain relieving tablets or physical measures aimed at reducing the discomfort and disability caused by condition. Recent advances in the application of physiotherapy techniques & walking aids and the improved understanding of biomechanics improves the field further.

Osiri et.al.⁶ suggested in their study TENS as a good pain killer for osteoarthritis knee and stated its effectiveness in reducing stiffness. The effectiveness of TENS for pain relief has been well supported in quite a large number of clinical trials. They found TENS was significantly effective in Osteoarthritis. ^{7,8,9} Cheng GL et. al.¹⁰ states Transcutaneous Electrical Nerve Stimulation used for 40 minutes duration & 60 minutes duration produce more effective in reducing pain. Hui Change ¹¹ and his associates established the repeated use of Transcutaneous Electrical Nerve Stimulation in chronic osteoarthritis knew over a few weeks period of treatment is more effective than its placebo effect. Smith et.al.¹² reported conflicting results in two separate studies of patients with OA knew. They reported that significantly more patients receiving conventional TENS demonstrated pain relief based upon pain report activity log, medication intake than those receiving placebo treatment.

On the other hand Ultra reiz current, which is a low frequency rectangular galvanic type of current introduced recently in German, is also effective in reducing pain. Jacek Goldzik ¹³ found that ultra reiz current is effective in arthritis and that has an analgesic effect. Bischoff HP ¹⁴ with his associates proves ultra reiz current or Trabert ultra stimulation is the classical electrotherapy modality which has analgesic effect. Although there is less evidence available because of the journals are published in German language which is difficult for further study. There is no such work exists on ultra reiz current in comparison with TENS.

The purpose of the study is 1] To determine the effect of Ultra reiz current in Osteoarthritis patients on reducing pain and improving functional activity. 2] To determine the effect of Ultra reiz current in comparison with TENS.

The hypothesis is that Ultra reiz current is more effective in comparison with TENS in reducing

pain and increasing functional ability of older adults with osteoarthritis knee.

MATERIAL AND METHODS

Forty five subjects, (34 Women and 11 Men) with osteoarthritis knee were recruited from Department of Physiotherapy, National Institute of Orthopaedically Handicapped., Kolkata. Study was performed in accordance with ethical consideration of the institute and their consent was taken prior to study. All the Subjects were screened on the basis of inclusion and exclusion criteria and randomly divided into three groups. The Inclusion criteria was the Current symptoms of chronic stable pain at least for 6 months and have limited physical or functional ability, whereas exclusion criteria was complain of instability "giving away" by historical findings, Ligamentous instability greater than grade- I, Knee flexion contracture, Multiple major joint involvement, any metallic implant in the joint, any nerve injury or neuropathic disorder involving knee joint,

All the subjects were then randomly allocated into three groups i.e. Group-A, Group-B & Group-C Each and every patient underwent thorough assessment and evaluation of their pain and functional status using WOMAC index. Each patient was given a file containing an assessment sheet, WOMAC index, data collection form. Collected data were tabulated in the data collection form and being again used after 1st week and 2nd week of treatment. Group-A (Experimental) received Ultra reiz current and exercise whereas Group-B received TENS and Exercise and Group-C received only exercise.

Ultra reiz Current

Prior to starting of treatment with ultra reiz, patients skin condition was checked Patients with dry or cracked skin were asked to apply cream for nourishment and report at the later date after healing. Patients were made to wash the skin thoroughly before the starting of the treatment. After the application of hypoallergenic gel, electrodes were placed over the skin. The patients were first given vertebral treatment to stimulate the vegetative nervous system prior to local treatment. Vertebral treatment was performed in EL4 position.

According to Trabert, one electrode is placed in the dorsal aspect of lumbar vertebra and other was placed at the lumbosacral junction. The treatment duration was for 15 minutes, intensity was progressed starting from mild and then increasing upto patient's tolerance level. After completion of vertebral treatment, electrodes are changed to place locally over the knee joint. Electrodes are placed on the either side of the knee joint. This treatment is also continued for 15 minutes.¹⁷ After finishing the treatment, patients were made to undergo the exercise protocol. The treatment is continued regularly for 5 days per week.

TENS

In this group all subjects underwent TENS burst treatment. The electrodes were placed on the lateral and medial side of the painful knee with sufficient amount of gel. The parameters in the machine were set at a frequency of 100Hz, burst frequency 2Hz, pulse length 100-200 μ s. Then intensity knob was turned up to make a firm and comfortable sensation within his tolerance.¹⁵ with duration of 30 minutes. After finishing the treatment patients underwent exercise protocol.

Exercise

All the patients of control group underwent only exercise protocol which is isometric resistance training exercise. This technique required the individual to generate tension in the muscle without changing the joint angle. The subject was in long sitting supported with pillow on the back, one rolled towel was placed under the knee and patients were instructed to press the towel & hold that pressure for 10 seconds or 10 counts. One set consisted of 5 repetitions of exercise and had to perform 4 sets of exercise and 5 minutes interval was given in between two sets. Patients had to perform three times within a day, one at the department and another two at the home in morning and evening respectively. Frequency of treatment was 5 days per week and total two weeks of duration.

Data Analysis

Data analysis was performed using SPSS-11.5 software. One way analysis of variance (ANOVA) was used to compare the significance of pain and functional ability between three groups Group-A, Group-B & Group-C and within the

groups between Starting day & 1st week, 1st week & 2nd week and 2nd week & starting day.

The post hoc analysis using multiple comparisons through LSD was done to measure the significance of homogeneity. P value of 0.05 has been used as level of significance.

RESULTS

Analysis of pain intensity on starting day, 2nd week between 3 groups showed significant (P value 0.034, 0.001) [Table – 1]. The clinical measures of pain within the group between 3 treatment measures (starting day, 1st week, & 2nd week) was shown significant in all three groups. P value was 0.0001 in all three groups. The functional ability also showed significant improvement in all three groups. (P value was 0.0001)

Variables		F value	P value
Pain	Starting day	3.668	0.034
	1 st week	0.429	0.645
	2 nd week	10.668	0.0001
Function	Starting day	1.056	0.357
	1 st week	1.103	0.341
	2 nd week	11.45	0.0001

Table:-1 Self-reported pain & functional ability between 3 groups by ANOVA.

Comparison between the groups on 2nd week the pain between Gr-B & Gr-C and Gr-C & Gr-A showed significant improvement (P value was 0.0001) whereas, between Gr-A & Gr-B showed non significant. [Table-2]

Clinical measures of functional ability on 2nd week comparison between Gr-B & Gr-C and between Gr-C & Gr-A showed significant improvement (P value was 0.185, 0.002 & 0.0001) but between Gr-A & Gr- B can't show any significant improvement. (P value 0.185)[Table-3]

Multiple comparison of analysis of Group-A between the treatment session of starting day & 1st week, 1st week & 2nd week and between 2nd week & starting day showed significant improvement. The P value was 0.0001 in all three sessions. Similarly in Group-B and Group-B and Group-C also the treatment between starting day & 1st week, 1st week & 2nd week and 2nd week & starting day showed significant improvement. The P value was 0.0001 in all three comparisons. [Table – 4&5]

	Between group	Mean Difference	Standard error of Mean	P value
STARTING DAY	Gr- A Vs Gr- B	2.617	1.627	0.115
	Gr- B Vs Gr- C	1.763	1.627	0.115
	Gr- C Vs Gr- A	4.38	1.627	0.01
1st Week	Gr- A Vs Gr- B	1.033	1.695	0.546
	Gr- B Vs Gr- C	1.54	1.695	0.369
	Gr- C Vs Gr- A	0.507	1.695	0.767
2nd Week	Gr- A Vs Gr- B	2.093	1.3061	0.116
	Gr- B Vs Gr- C	3.853	1.306	0.005
	Gr- C Vs Gr- A	5.947	1.306	0.0001

Table-2: Multiple comparison of pain by LSD between 3 groups.

	Between group	Mean Difference	Standard error of Mean	P value
STARTING DAY	Gr- A Vs Gr- B	3.227	4.712	0.497
	Gr- B Vs Gr- C	3.62	4.712	0.447
	Gr- C Vs Gr- A	6.847	4.712	0.154
1st Week	Gr- A Vs Gr- B	1.343	3.848	0.729
	Gr- B Vs Gr- C	4.14	3.848	0.288
	Gr- C Vs Gr- A	5.483	3.848	0.162
2nd Week	Gr- A Vs Gr- B	5.853	4.343	0.185
	Gr- B Vs Gr- C	14.347	4.343	0.002
	Gr- C Vs Gr- A	20.2	4.343	0.0001

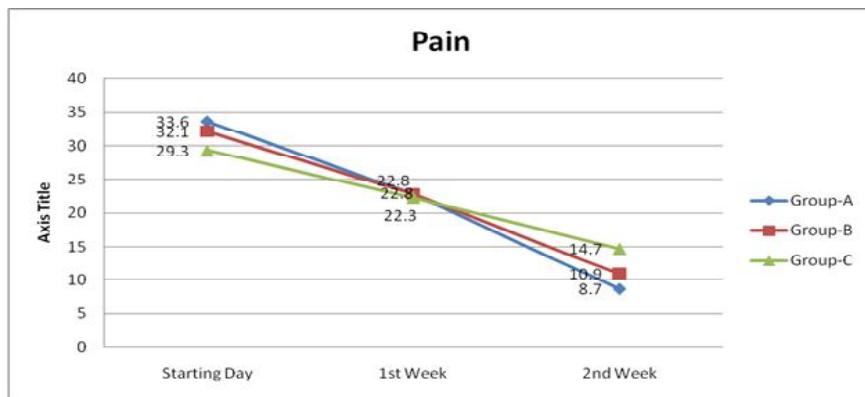
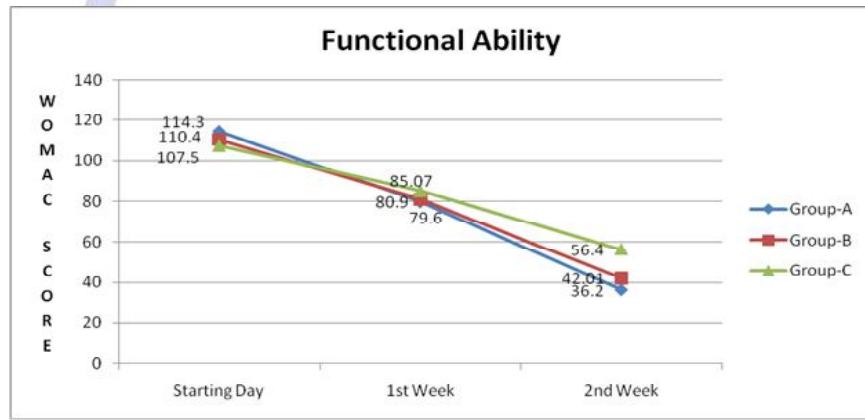
Table 3: Multiple comparison of functional ability by LSD between 3 groups.

	Between group	Mean Difference	Standard error of Mean	P value
Groups-A	Starting day Vs. 1 st week	10.833	1.3531	0.0001
	1 st week Vs. 2 nd week	14.067	1.3531	0.0001
	Starting day Vs. 2 nd week	24.5	1.3531	0.0001
Groups-B	Starting day Vs. 1 st week	7.183	1.8805	0.0001
	1 st week Vs. 2 nd week	13.007	1.8805	0.0001
	Starting day Vs. 2 nd week	20.19	1.8805	0.0001
Groups-C	Starting day Vs. 1 st week	6.96	1.3645	0.0001
	1 st week Vs. 2 nd week	7.613	1.3645	0.0001
	Starting day Vs. 2 nd week	14.573	1.3645	0.0001

Table4: Within group analysis using Multiple comparison of pain.

	Between group	Mean Difference	Standard error of Mean	P value
Groups-A	Starting day Vs. 1 st week	34.747	4.9931	0.0001
	1 st week Vs. 2 nd week	43.433	4.9931	0.0001
	Starting day Vs. 2 nd week	78.18	4.9931	0.0001
Groups-B	Starting day Vs. 1 st week	30.177	4.5692	0.0001
	1 st week Vs. 2 nd week	38.923	4.5692	0.0001
	Starting day Vs. 2 nd week	69.1	4.5692	0.0001
Groups-C	Starting day Vs. 1 st week	22.417	3.1752	0.0001
	1 st week Vs. 2 nd week	28.716	3.1752	0.0001
	Starting day Vs. 2 nd week	51.133	3.1752	0.0001

Table 5: Within group analysis using Multiple comparison of functional ability.

**Graph 1:** Graphical presentation of Pain.**Graph 2:** Graphical Presentation of Functional Ability

DISCUSSION

Ultra reiz current is the physiotherapeutic pain relieving modality used in Germany. The present study evaluates the effectiveness of Ultra reiz current on pain and functional ability of older patients with knee osteoarthritis. The primary purpose of the study was to determine the effect in comparison with TENS.

The result showed that Ultra reiz is effective in reducing pain and functional ability in older patients with osteoarthritis knee but there is no statistically significant improvement of treatment in comparison with TENS.

Previous studies^{13,14} have showed that Ultra reiz current is effective in arthritis and that has an analgesic effect. There are several studies^{6,10,11} also established that TENS is effective in reducing pain with Osteoarthritis knee than its placebo effect. Dougherty¹⁶ discussed TENS as an alternative to drug for the management of the acute and chronic pain. He reported that the result of treating a wide variety of orthopaedic and neurologically based pain with conventional TENS applied over a trigger point or peripheral nerves supplying the painful areas exhibited

good pain relief & increased mobility with improved function.

After 1st week of treatment, Ultra reiz and TENS had the improvement which was shown in percentage calculation and the result was shown that Ultra reiz has 32.14% and TENS has 23.22% of improvement. Similarly after 2nd week of treatment it was seen that Ultra reiz is more effective (74.10%) than TENS (65.16%) and control group.

This is due to that TENS reduces pain by directly acting on the large diameter afferent fibre and facilitating the presynaptic inhibition of T-cells (pain gate theory). The Ultra reiz also reduces pain by the same gate control theory but in addition to TENS, Ultra reiz have special effect that it improves the circulation.

Previous study¹⁸ showed that the main source of pain in osteoarthritis knee lies in altered hydrodynamics within the bone or so called bone marrow lesion due to edema or increased intra-osseous pressure due to venous congestion or intra-articular hypertension by increased synovial fluid production and improved venous return within the subchondral bone. It has been

demonstrated that reduction of intra-osseous pressure relieves pain.¹⁹

Increased blood flow can alter the hydrodynamics of bone (Wadsworth & Chanmugan, 1980). Ultra reiz current produce increased circulation that release the congestion of subchondral bone, thus decreasing the intra osseous pressure and relieves pain. It has also been shown that increased circulation can wash out pain producing noxious bio chemical elements like prostaglandin and bradykinin (Wadsworth & Chanmugan).

CONCLUSION

The study demonstrated that Ultra reiz current showed statistically significant improvement in relieving pain and functional ability in comparison with TENS in older patients with osteoarthritis knee.

ETHICAL APPROVAL: By the dolphin(PG) institute, dehradun, india which is consist of member from different university, the departmental head, and the other faculties of the department.

FUNDING: Self financed.

CONFLICT OF INTEREST: None

REFERENCES

1. Felson D.T., The epidemiology of the knee OA results from Framingham study, Arthritis Rheumatism, 41, 1343-55, 1990.
2. Goldin R.H., Mc adum L.,Louie J.S., et.al.Clinical & radiological servey incidence of OA among obese patients. Ann Rheumatic Disease, 35, 349—53, 1976.
3. Leach R.E., Baumgard S, Broom J, Obesity its relationship to OA of knee, Clinical Orthopedics, 93, 271-73, 1973.
4. Sarille P.D., Dickson J., Age and weight in oa of knee, Arthritis Rheumatism, 11,635-44, 1968.
5. Sokoloff L., Mikelson O., Silverstein E., Jay G.E., Experimental obesity and OA, Am. J. Physiology, 198, 765-70, 1960.
6. Osiri M., et.al. Transcutanious electrical nerve stimulation in osteoarthritis knee, Coctrane database (4) CD 002823.
7. Smith C.R., Lewith G.T., & Machin D., Transcutanious electrical nerve stimulation And Osteoarthritis pain, Physiotherapy, 69, 266, 1983.
8. Taylor P., Hallwell M., & Flaherty L., Treatment of osteoarthritis of knee with TENS, Pain, 11, 233, 1981.
9. Lewis D., Lewis B., Sturrock R.D., Transcutanious electrical nerve stimulation in osteoarthritis – A therapeutic alternative, Ann Rheumatic Disease, 43, 47, 1984.
10. Cheng G.L., Hui chan C.W., et.al. Would TENS to exercise training produce better physical performance outcome in people with knee osteoarthritis than other intervention alon Clinical Rehabilitation, 18,487-97, 2004.
11. Hui chan C.W., Cheng G.L., Chan K.M., Does 4 weeks of TENS or isometric exercise produce cumulative reduction of OA knee pain, Clinical Rehabilitation, 16, 749-60, 2002.
12. Smith C.R., Lewith G.T., & Machin D., Transcutanious electrical nerve stimulation And Osteoarthritis pain, Physiotherapy, 69, 266, 1983.
13. Jasec Glodzik et.al. Ultra reiz current as a way of physical treatment, Pain 1990.
14. Bischoff H.P., Physical therapy of arthrosis, journal of orthopaedics, 15, 388-393, 1986.
15. Taylor P., Hallwell M., & Flaherty L., Treatment of osteoarthritis of knee with TENS, Pain, 11, 233, 1981.
16. Dougherty R.J., TENS an alternative to drug in the treatment of acute and chronic pain presented at 34th science assembly. Am Acad of Fam Phys 4, 1982.
17. Instruction for the use of phyaction – 780, Uniphy B.V., 1993.
18. Brandy W.D., Loveless C.V., et.al., adaptation of skeletal muscle to resistance training, J of Orthopaedic & Sports physical Therapy 12,248-255, 1990.
19. Carolyn K, Lynn A.C., Therapeutic exercise and foundation Jeypree Brothers_p-8 3rd Ed
20. Oleveria S.A., Felson D.T., et.al. incidence of symptomatic hand hip, knee OA among patients in health Maintainance organization, Arthritis Rheumatism, 40, 1134-41, 1995.
21. Turek Samuel L., Orthopaedic principle & their application, J.B.Lippincote Co. P-348, 1984.

How to cite this article:

Siddhartha Sen, T.R. Nanda kumar , S.S. Rau. Effects of Ultra Reiz current and TENS on Pain and Functional ability in older patients with Osteoarthritis knee. Int J Physiother Res 2013;04:171-76.