

ORIGINAL ARTICLE

COMPARISON OF DRY NEEDLING WITH CONVENTIONAL PHYSIOTHERAPY IN PATIENTS WITH KNEE OSTEOARTHRITIS FOR PAIN AND FUNCTIONAL IMPROVEMENTS**Tahreem Anwar, Wajida Perveen, Riaz Hashmi*, Misbah Amanat Ali, Muhammad Akhtar**, Sahreen Anwar*****

Sialkot College of Physical Therapy, Amin Welfare and Teaching Hospital, *Department of Physiotherapy, Syed Medical Complex, Sialkot, **Department of Physical Therapy, University of Lahore, ***Department of Physical Therapy, Independent Medical College, Faisalabad, Pakistan

Background: Knee Osteoarthritis is a degenerative disease that affects many individuals in their forties or later and can lead towards impairment of physical functions and poor quality of life. Our study aimed to compare the effectiveness of dry needling with conventional physical therapy in patients with knee osteoarthritis (OA). **Methods:** It was a non-randomized clinical study conducted after ethical approval at Syed Medical Complex and Amin Welfare and Teaching Hospital Sialkot in 6 months. Sample size was calculated to be 58 using WHO calculator. Purposive sampling technique was used to enrol the participants according to predetermined eligibility criteria. They were allocated into two groups. Group A received conventional physical therapy treatment and group B received dry needling for 3 weeks, 2 sessions per week. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale and Numeric Pain Rating Scale (NPRS) were used to measure the outcomes before 1st treatment session and after last session. Paired sample *t*-test and independent sample *t*-test were applied to compare the results, and $p \leq 0.05$ was considered significant. **Results:** Pre-treatment WOMAC score in group A was 50.07 ± 11.835 and in group B it was 45.87 ± 12.512 . Post-treatment WOMAC score in group A was 38.87 ± 13.731 and in group B it was 24.33 ± 8.926 . The scores improved in both groups, but group B showed significant improvement. **Conclusion:** Both conventional physical therapy and dry needling are effective to manage pain and functional limitation in patients with knee OA. Dry needling proved more effective compare to conventional physical therapy.

Keywords: Knee, Osteoarthritis, Dry needling, Conventional physical therapy, Western Ontario and McMaster Universities Osteoarthritis Index, WOMAC, Numeric Pain Rating Scale, NPRS

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INTRODUCTION

Osteoarthritis affects more than 0.5 billion people worldwide, mainly involving women. Population affected during 1990–2019 rose by 48%, rendering OA 15th highest cause of the years lived with disability.¹ The aetiology is poorly understood. Since it is a multi factorial disease, studies have discovered a number of causative factors including obesity, genetic predisposition, bone density, trauma, and occupational injuries.² At the initial stage the symptoms include occasional pain and stiffness while advanced stage symptoms of osteoarthritis involve continuous pain and swelling at the localized areas, crepitus and joint locking.³ Treatment varies according to the condition and preferences of the patient. Non-pharmacologic therapies⁴ include conventional physical therapy (ROMs, knee stretching and strengthening exercises, knee isometrics), assistive devices, electrotherapy devices, acupuncture and lifestyle modification.⁵ Patients seek to adopt treatment options that are relatively less invasive, cheap and safer.⁶

Dry needling is one of the emerging physical therapy interventions getting popularity in the current era. It is relatively less invasive and cheap intervention

with low risk factors.⁷ According to Leonid and Simon, dry needling is a new technique which was developed to treat pain caused by the trigger points in the muscles.⁸ In this method practitioner insert needle at pain points producing analgesic effect.⁹ There are a few studies on acupuncture for knee osteoarthritis. Dry needling (DN) work on the principle of acupuncture, both procedures used special needles but acupuncture have specialized different theory of energy channels and energy flow in the body.¹⁰ DN alters both central and peripheral sensitization, reduces pain of local and remote areas and improves activation of muscles.¹¹ A moderate quality evidence synthesized in a recent systematic review, on short term effects of DN with periosteal stimulation on pain and functions in subjects with Knee Osteoarthritis (KOA).¹² Many studies have used dry needling of the knee joint without targeting specific trigger points to treat pain and disability in patients with knee osteoarthritis, although point specific has been reported more effective.¹³ The effects of trigger point dry needling in the treatment of knee osteoarthritis has been well documented.¹⁴ In a recently reported case report, dry needling was found effective in an elderly lady with chronic lumbar radiculopathy and medial KOA.¹⁵ Dry

needling is an effective treatment under the scope of physiotherapy practice to treat musculoskeletal problems, but anatomy and risk factors of problem consideration are critical. DN is a new technique to treat musculoskeletal pains with low risk factors being less invasive and cheap.¹⁶

Currently, little evidence is available about the effectiveness of dry needling in patients with KOA. Although many physiotherapists have been practicing DN in their clinical practice, but no primary studies have been reported from Pakistan about its outcome in patients with KOA. The current study evaluates the efficacy of DN as compare to conventional physical therapy treatment in KOA for pain management and improving functional abilities.

METHODOLOGY

It was a non-randomized clinical study conducted at Physical Therapy Departments of Syed Medical Complex, and Amin Welfare and Teaching Hospital Sialkot from November 2018 to April 2019. This study was approved by Riphah Ethics Committee vide Ref No. RCR and AHS/REC MS-OMPT/027 dated 15 Oct 2018.

Taking into account the number of patients with KOA visiting both the hospitals during last 6 months, a sample of 58 patients was calculated through WHO calculator.¹⁶ Confidence interval was 95% with 5% margin of error. The patients with KOA visiting outpatient Physical Therapy Departments were screened for their eligibility. Inclusion criteria were patients aged 40–60 years with KOA meeting the American College of Rheumatology criteria¹⁷ and knee pain for more than 6 months. Patients with osteosarcoma, fracture, or with history of trauma were excluded from the study. All those patients who agreed to participate signed informed consent and were enrolled in the study.

Fifty-eight participants were divided into two groups. Both groups were given similar baseline treatment in the form of heat by moist heat pads. Group A received conventional physical therapy treatment in the form of quadriceps isometric (10×10) and group B received dry needling. Treatment duration was 30 min, 2 sessions per week for 3 weeks. A thorough case history, detailed physical examination and knee regional assessment was taken by physiotherapist before the start of treatment. Numeric Rating Pain Scale (NPRS)¹⁸ and Western Ontario and McMaster Universities Osteoarthritis index (WOMAC)¹⁹ were used to collect the data at baseline and 3 weeks after the treatment.

Group A Protocol: After 10 min of moist hot pack application, the patients were treated with conventional physical therapy, including strengthening exercises of muscles around the knee joint (10 reps in 3 sets) and stretching exercises of calf muscle and hamstrings, soft tissue mobilization, cycling on a static cycle for 5 min and knee Range of Motion (ROM's).

Group B Protocol: After 10 min of moist hot pack application, the patients were treated with dry needles around the knee joint at four points. Needles were left for 10 min at those points (Figure-1).

Shapiro-Wilk test was used to test the normality of data distribution. Descriptive statistics were displayed as mean and standard deviation. Paired sample *t*-test was used to interpret the results and differences within each group, independent sample *t*-test was used to compare the results between the groups, and $p \leq 0.05$ was considered statistically significant.



Figure-1: Dry needles applied to patient with KOA

RESULTS

After 3 weeks of intervention 58 participants with KOA completed the study, none were lost to follow-up. There were no significant differences between groups in the baseline values. Mean age of group A was 55.67 ± 10.66 years, height 164.53 ± 9.78 Cm, weight 84.00 ± 13.70 Kg, and BMI was 31.26 ± 13.70 . Mean age Group B was 57.13 ± 10.45 years, height 167.20 ± 10.79 Cm, weight 79.87 ± 11.89 Kg, and BMI was 28.76 ± 5.07 .

Pre-treatment WOMAC score in group A was 50.07 ± 11.835 and in group B was 45.87 ± 12.512 . Post treatment WOMAC score in group A was 38.87 ± 13.731 and in group B it was 24.33 ± 8.926 . Pre- and post-treatment differences of scores in both groups indicate the reduction of pain and functional limitation in both groups (Table-1). Reduction in WOMAC score in group B was more as compare to group A ($p < 0.05$), which indicates that dry needling proved more effective as compare to conventional physical therapy to reduce pain and functional limitation.

Pre-treatment NPRS score in group A was 6.27 ± 1.163 and in group B it was 5.73 ± 1.280 . Post-treatment NPRS in group A was 4.67 ± 1.676 and in group B 2.40 ± 1.242 . Pre- and post-treatment differences of scores in both groups indicate a reduction in pain in both groups but reduction in numeric rating pain score in group B is more as compared to group A ($p < 0.05$) revealing that dry needling proved more effective as compare to conventional physical therapy to reduce pain (Table-2).

Table-1: Paired sample *t*-test for difference in pre- and post-treatment NPRS and WOMAC scores within group A and B

Groups		Mean±SD	<i>p</i>
A	Pre-treatment score of NPRS	6.27±1.163	0.001
	Post-treatment score of NPRS	4.67±1.676	
	Difference in score of NPRS	1.60±0.487	
B	Pre-treatment score of NPRS	5.73±1.280	0.000
	Post-treatment score of NPRS	2.40±1.242	
	Difference in score of NPRS	3.33±0.038	
A	Pre-treatment score of WOMAC	50.07±11.835	0.000
	Post-treatment score of WOMAC	38.87±13.731	
	Difference in score of WOMAC	11.20±2.104	
B	Pre-treatment score of WOMAC	45.87±12.512	0.000
	Post-treatment score of WOMAC	24.33±8.926	
	Difference in score of WOMAC	21.54±3.586	

Table-2: Independent sample *t*-test between groups A and B for pre- and post-treatment NPRS and WOMAC scores

Time of assessment	Group	Mean±SD	<i>p</i>
Pre-treatment score of NPRS	A	6.27±1.163	0.242
	B	5.73±1.280	
Post-treatment score of NPRS	A	4.67±1.676	0.000
	B	2.40±1.242	
Pre-treatment total score of WOMAC scale	A	50.07±11.835	0.353
	B	45.87±12.512	
Post-treatment total score of WOMAC scale	A	38.87±13.731	0.002
	B	24.33±8.926	

DISCUSSION

Our study aimed to identify the effectiveness of dry needling as compare to conventional physical therapy to treat pain and functional limitation. Majority of the individuals were overweight. Both dry needling and conventional physical therapy had produced significant outcomes to reduce pain and functional limitation.

A recently published systematic review by Khan I *et al*, from Pakistan which included ten studies from 2000 to 2019, reported that dry needling had a positive effect in 50% of the screened studies in managing pain in myofascial trigger points, heel pain and pain due to muscle tightness. There was a negative effect of DN in KOA, atraumatic knee pain, and ROM in subjects with plantar fasciitis.²⁰ Our results contradict the findings about effects of dry needling in KOA of that review.

Conventional physical therapy includes patient education, strengthening exercises, and aerobic ROMs. It is effective in KOA patients to reduce pain and disability. Aerobic walking and home-based quadriceps strengthening exercises are equally effective for managing pain and reducing disability.²¹ In our study, dry needling was found to be a useful adjunct to the conventional PT in patients with KOA.

Saha P *et al*²² surveyed the practices followed by physiotherapists in India for management of KOA, and found that most of the physiotherapists were using Transcutaneous Electrical Nerve Stimulation (TENS), ultrasonic therapy and dry needling along with patients'

education and strengthening exercises. Although there are no details of results of these interventions, still the experiences of Indian physiotherapists may be considered.

Farazdaghi MR *et al*²³ in a double blind randomized controlled trial on 40 subjects with pain and trigger points around hip or knee joints, found that DN was effective in improving the outcome measures.²³ They used Visual Analogue Scale for pain and sensitivity, Knee Injury and Osteoarthritis Outcome Score, algometer, Y balance test and administered DN for three sessions only on participants of 45–70 years of age, while our population was 40–60 years old and we used NPRS and WOMAC to measure the outcome. We offered 6 treatment sessions in 3 weeks. They also measured balance and sensitivity to pressure which was not included in our study.

The results of our study agree with the findings of a large multicentre clinical trial, in which Dunning *et al*¹⁶ used periosteal dry needles in conjunction with exercise and manual therapy to treat knee OA. The participants could discontinue the medication for pain management and there was significant improvement in the WOMAC scores, the major difference in this study was the use of periosteal DN, a larger sample size and their treatment time was three months as we used only DN (without currents) on a smaller sample and for three weeks only.

In a secondary study conducted in Spain, low to moderate level evidence were found suggesting a positive effect of trigger points dry needling on pain and subsequent disability in subjects with Patello-femoral pain syndrome, but not for knee OA or post-surgical knee pain especially in short term treatment.²⁴ In our study, dry needling was found effective in managing pain in subjects with KOA.

In a pilot study of a double blind RCT conducted by Sánchez-Romero *et al*²⁵ compared the effects of DN and sham DN along with a therapeutic exercise program for 12 weeks in subjects with KOA and myofascial trigger points in the muscles of the thigh. They found no improvement in pain intensity in terms of NPRS and functional abilities on WOMAC. The differences with our study are in inclusion criteria and length of treatment period.

The results of a double blind multicentre RCT, explored the effects of DN using a sham group in older adults with KOA on pain and function. Their sample size was almost comparable to our study (n=62), while they offered 6 treatment sessions and followed after one year. They measured outcomes using NPRS, WOMAC, Barthel Index, Time up & go test, global rating of change scale and EuroQoL group 5-dimension self-report, questionnaire for between group difference in pain, function, functional status evaluation, balance assessment, clinical assessment and health related

quality of life respectively. They found no differences in NPRS and WOMAC scores after one year but found reduced consumption of medications in DN group.²⁶ There were cultural and lifestyle differences in the populations of both the studies, and they used more outcome measures than our study. Although they found no significant differences but our study population reported better outcomes in terms of pain and functional abilities.

Vervullens S *et al* reported that single session of DN used to release the myofascial trigger points in the muscles surrounding knee joint in subjects with KOA may relieve pain via nociception processing, but there were no long lasting outcomes.²⁷ They used visual analogue scale for pain and gait analysis for spatiotemporal assessment of outcomes; their sample size was comparable to us (n=62). We used NPRS and WOMAC only.

The limitations of our study included, small sample size, gender distribution disparity, lack of classification of stage of osteoarthritis and only short-term effects of both the treatments. Further studies may be conducted to explore the long-term effects of dry needling and conventional physical therapy in patients with osteoarthritis of the knee joint. Comparative effects of both techniques at different stages of knee osteoarthritis must also be explored.

CONCLUSION

Both conventional physical therapy and dry needling are effective interventions to reduce the pain and improving functional limitations in patients with KOA. However, dry needling was found comparatively more effective and may be used as an adjunct to other treatment options.

DISCLOSURE

The abstract of study including some of the data was presented as Oral Presentation in 38th Physiotherapy Research Society, UK, annual scientific meeting held on 16th April 2021 virtually, and the proceedings have been published in Journal of Academic Development and Education (JADE), issue 14 autumn 2021, Keele University UK.

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Address for Correspondence:

Ms Wajida Perveen, Associate Professor/HOD at Sialkot College of Physical Therapy, Amin Welfare and Teaching Hospital, Sialkot, Pakistan. **Cell:** +92-333-3507157

Email: wjda_noor@yahoo.com, wajopri@gmail.com; **ORCID:** <https://orcid.org/0000-0002-4833-0928>

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RH: Data collection and assembly

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