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ORIGINAL ARTICLE

Comparative Effectiveness of Integrated Neuromuscular Inhibition Technique Along with Conventional Treatment Vs Conventional Treatment Alone in Patients of Knee Osteoarthritis

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ABSTRACT

Background: Due to cartilage damage adduction movement increased at knee joint which alters biomechanics of knee joint. All muscles attached to knee joint get overstretched, tightened and trigger points formed in them produces pain and alters functioning of knee joint.

Objective: To determine which treatment approach either integrated neuromuscular inhibition technique INIT combined with conventional treatment or conventional treatment alone was effective in reducing pain, improving ROM and quality of life in patients with knee osteoarthritis.

Material and Methodology: A randomized clinical trial was conducted on n=28 patients (23 females, 5 males) with age group of 45-70 years were randomly allocated into 2 groups. Group A received conventional treatment along with INIT technique and group B received conventional treatment alone, treatment was given for 2 weeks with 3 sessions / week. NPRS was used to measure pain at baseline, after 1st, 2nd, 4th and 6th session of treatment. ROM through goniometer measured at baseline, after 1st and at end of 2nd week (6th session). WOMAC scale for quality of life improvement measured at baseline and at end of 2nd week (6th session). SPSS version 20 was used for data analysis.

Results: In-Between group analysis showed significant difference exist in knee pain and WOMAC scale values. However no, significant difference exist between both groups for knee flexion and extension except for knee extension range, improved after 6th session.

Conclusion: Reduction in knee pain and disability of patient along with improved knee ROM was remarkably noted in the patients who received INIT technique combined with conventional treatment.

Keywords: Osteoarthritis, trigger points, INIT technique, conventional treatment, Integrated Neuromuscular Inhibition Technique

Ethical Approval Number: TUF/IRB/178/2023

INTRODUCTION

Osteoarthritis (OA) is the degenerative changes that most commonly effect elder population. OA is derived from Greek word 'osteo' means bone 'arthro' means joint and 'itis' means inflammation. It's the condition of synovial joints in which hyaline cartilage get damage, inflammation, osteophyte formed and sub-condral bone sclerosis occurred. Medial compartment is 10 times more effected as compared to lateral side because more mechanical stress is exerted on medial side of the joint (1).Women have greater chance of its development than men, its prevalence is 42.1% and 31.2% in women and men respectively. Osteoarthritis is classified into 2 types idiopathic/primary and secondary. Its symptoms include popping, grinding, swelling, locking, giving way, pain and stiffness increases after rest , in morning ,sitting for a long period of time, sometimes pain get worse at night and after physical activity (2). Risk factors for developing knee osteoarthritis includes age, female gender, heredity, menopause, repetitive micro and macro trauma, joint surgery, alcohol and tobacco use (3). Loss of articular cartilage in knee osteoarthritis alters the normal biomechanics of lower limb. Inconsistency was observed between patient intensity of pain and radiological findings. This inconsistency explains the presence of myo-fascial trigger points in surrounding muscles. Treatment of those trigger points reduces pain and improves the functional capacity of patients with knee OA (4). Osteoarthritis causes increased knee adduction movement, formation of varus deformity that occurred due to medial joint space narrowing. These changes alters the relationship of surrounding soft tissues structures tightens illiotibial band along with formation of trigger point in it which produces pain and impairs the functional abilities (5). Hyperirritable structures feels like tender knots or tight bands in skeletal muscles are trigger points. About 75% pain is caused by them and remained undiagnosed structure in allopathic medicine. Risk factors for formation of trigger points include trauma, injury, mechanical, emotional stress etc. Chronic inflammatory and auto-immune diseases like osteoarthritis in which prolonged pain leads towards trigger point formation and refer pain in surrounding muscles. Trigger points formed in adductors, sartorius, gastrocnemius, soleus, vastus medialis, lateralis, intermedius muscle, hamstrings, rectus femoris can refer pain in knee area (6). Active trigger points were frequently palpated in vastus medialis, lateralis and gastrocnemius muscles of patients with painful knee osteoarthritis. (7). Greater number of triggers were observed in unilateral knee osteoarthritis as compared to unilateral hip osteoarthritis. More than 37.5% of patients with knee OA experiences pain in both medial and lateral muscles. (4). Prevalence of myofascial pain increases to 35-95% which chronicity of symptoms. Muscles mostly commonly effected were quads and hams. (8). Active TrPs and almost similar number of latent trigger points exist in knee osteoarthritis. (4). 75.43% trigger points present in vastus medialis muscle and 65.78% in vastus laterals muscle in knee OA (9).

METHODOLOGY

Single blinded, randomized clinical trial was conducted on 28 knee osteoarthritic patients. Ethical approval was taken from The University of Faisalabad (TUF/IRB/178/2023) before the initiation of research. Data was collected from OPD of Allied, District Head Quarter and FIC hospital Faisalabad. Total 35 knee osteoarthritic patients were screened according to inclusion, exclusion criteria and total 28 knee osteoarthritic patients were included to fulfil the sample size which was calculated by using formula given by Charan and Biswas (10). Convenient sampling technique was used and patients were randomly allocated into 2 groups A and B with 14/14 patients included in both groups. Patients with age 45-70 years having osteoarthritic grade II,III,IV according to kellgren lawrence classification in knee joint, patient who was willing to participate, with presence of triggers in quads, hams, gastrocnemius, adductors, tensor fascia lata muscles, knee pain with (3-5) NPRS level were included in the study. Patient who was already taking any other physiotherapy treatment or soft tissue technique, any diagnosed systemic issue, any recent surgery of lower extremity, total knee replacement, patient who was not

willing to participate in study, any referred pain pattern to lower extremity diagnosed with straight leg raise, any diagnosed psychological disorder were excluded from study. After taking informed consent from patient the patients where included randomly into 2 groups. Group A and B. Both groups received baseline treatment (warm-up) of hot moist pack for 10min and US applied for 7 min on knee joint with 1 MHz frequency, 0.8W/cm2 intensity (5) applied along patellar edges, articular lines and along popliteal fossa (11). Ultrasound therapy was used to treat pain, reduces inflammation and help in healing of tissues (12). Group A received INIT technique along with conventional treatment. INIT technique includes ischemic compression applied through thumb on trigger point present in any muscle of quadriceps, hamstring, tensor fascia lata, adductor, gastrocnemius muscle. Compression was increased gradually until first resistance was felt and maintained until this resolves, further increases then until no tissue resistance was felt under thumb. This process was maintained for 90sec and repeated 3-5 times per session. Positional release technique in which after pressure applied on trigger point move the limb in position of ease and maintained this position for 20 sec. This process was repeated 3-5 times per session. Then MET's applied on muscle in which isometric contraction was maintained for 7-10sec against 20-25% strength. After completion of muscular contraction the limb was moved away for muscular stretch and then position was maintained for 30 sec.

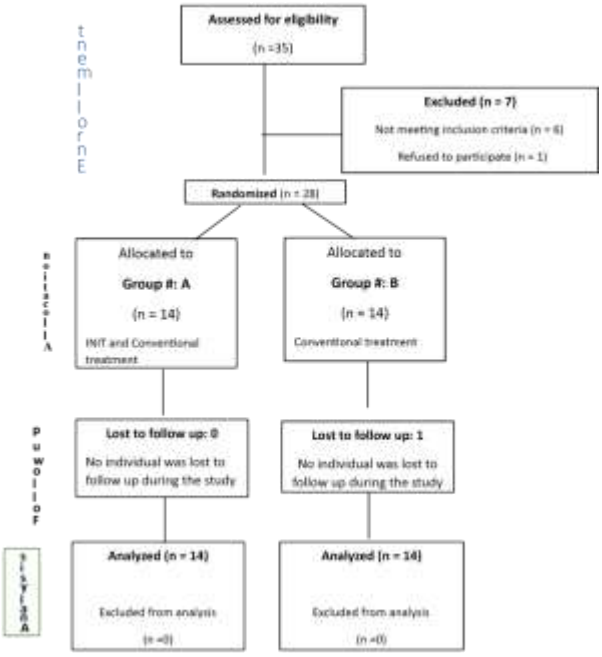

Figure 1: Consort Diagram

This whole process was repeated 3-5 times per session. This technique was completed in 15-20 minutes (13). Conventional treatment includes AROMS of quads and hamstring muscles repeated 10 times in one session, hamstring stretch applied 3 times in 3 sets with rest period of 30sec in between after each set. Total time for which stretch was maintained is 20-30sec (14). Static exercises of quads and hams was performed in 3 sets, repetition 10 times in each set. Rest period of 1-3 min was given in between sets(5). >8 sec isometric contraction was maintained during static exercises. Concluded up with cool-down period of 5-10min in which light movements of full body was performed (15). Group B received baseline treatment, conventional treatment and cool-down exercises. Primary outcome measures included pain and range measured through VAS and goniometer respectively. Secondary outcome measure included WOMAC scale. Full treatment was applied for 2 weeks with 3 sessions given per week on alternative days. Total 6 treatment sessions were given to knee osteoarthritic patients. Statistical analysis was applied through SPSS version 20. Results were drawn by using repeated measure ANOVA, independent sample t-test, paired sample t-test for parametric data and friedman test, Mann Whitney test applied for non-parametric data. Data normality distribution was checked by Z-score skewness, kurtosis value and Shaphiro-Wilk test.

RESULTS

Normality of data was checked before going for inferential statistics. Skewness and Kurtosis was measured to check normality of data. This test was useful in both small and large sample sizes. The formal normality tests Shapiro-Wilk and Kolmogorov – Smirnov test and eye ball test shows incompatible results for the same data so, to resolve the present problem Skewness and Kurtosis used to test the normality of data. The z-score for either skewness and kurtosis value greater than or less than ± 1.96 showed no normal distribution of data but the value in between showed its normal distribution (16). A research article was available in which both parametric and non-parametric test were applied to find results of the study (11). For small sample size the skewness kurtosis value within ± 1.96 was sufficient to find data normality (17). If sample size was less than 50 than Shapiro-Wilk test was used for normality calculation but it can handle data sample size of more than 2000 population. If the Sig. value was greater than 0.05 than data was considered to be normality distributed if Sig. value was less than 0.05 so, data was not normally distributed (18).

Table 1 showed normality distribution, Z-values of Skewness and Kurtosis along with Shapiro-Wilk p-values for data variables. The Z-values of almost all variables are within range of ±1.96 and p-value of most of data variables was greater than 0.05 which means the data was normality distributed except for knee extension range. This data fulfilled the criteria for the application of parametric test on all the variables except for knee extension ROM on which non-parametric tests were applied for conclusion of results. Table 2 showed in-between group analysis of pain, ROM and quality of life. The mean score for pain at baseline for group A was 7.42 ± 1.08 and group B was 8.00 ± 1.03 and after 6th session improved to 3.14 ± 1.02 for group A and 5.50 ± 1.28 for group B. P-value showed no significant difference at baseline but extremely significant difference exist at 6th session. For remaining sessions pain values see table 2. For knee flexion ROM the mean score at baseline for group A was 104.57 ± 11.37 and for group B was 104.42 ± 12 and was improved to 119.14 ± 10.03 for group A and 111.00 ± 12.07 for group B on final session. P-value showed no significant difference at baseline and at end of 2nd week for knee flexion ROM. For values after 1st week see table 2. The in between group analysis of knee extension ROM the mean score for group A at baseline was 14.85 ± 5.26 and for group B was 14.85 ± 6.926 and it was improved to 8.71 ± 1.93 for group A and 12.50 ± 6.60 for group B on final session. P-value showed no significant difference in-between groups at baseline but significant difference was noted at end of 2nd week. For values after 1st week see table 2. For quality of life measures WOMAC scale was used. The mean score at baseline was 68.92 ± 10.67 for group A and for group B was 71.50 ± 13.32 and it was improved to 51.14 ± 10.06 for group A and 64.64 ± 14.25 for group B at end of final session. P-value showed no significant difference at baseline but significant difference was noted after 2nd week. The mean values of pain, range and WOMAC scale showed more improvement noted in group A as compared to group B. Independent sample t-test applied on pain and knee flexion ROM while Mann-Whitney applied on knee extension ROM and paired sample t-test applied for quality of life measures.

Table 1: Tables of Skewness and Kurtosis values for data normality calculation.

Data Variables	Z-Skewness	Z-Kurtosis	Shapiro-Wilk Sig. p-value
Pain at baseline	-1.04	0.68	.052
Pain after 1st session	-1.64	0.69	.018
Pain after 2nd session	-0.61	-0.48	.049
Pain after 4th session	0.07	-0.59	.161
Pain after 6th session	-0.02	-0.37	.080
Flexion ROM at baseline	1.43	-0.64	.090
Flexion ROM after 1st week	0.25	-1.26	.145
Flexion ROM after 2nd week	-0.53	-1.21	.082
Extension ROM at baseline	0.02	0.12	.000
Extension ROM after 1st week	1.20	1.11	.000
Extension ROM after 2nd week	-0.53	-1.21	.000
WOMAC at baseline	0.05	-1.24	.089
WOMAC after 6th session	1.17	-0.89	.076

Table 2: In between group analysis of pain, ROMs and quality of life for groups A, B.

Outcome measure knee Pain	Sessions	Group A	Group B	P
NPRS	At baseline	7.42 ± 1.08	8.00 ± 1.03	0.167
	After 1st session	6.50 ± 1.09	7.71 ± 1.06	0.006
	After 2nd session	5.50 ± 1.09	7.21 ± 1.05	0.000
	After 4th session	4.28 ± 0.91	6.28 ± 1.06	0.000
	After 6th session	3.14 ± 1.02	5.50 ± 1.28	0.000
Knee Flexion ROM	At baseline	104.57 ± 11.37	104.42 ± 12.13	0.975
	After 1st week	112.57 ± 10.40	106.92 ± 11.80	0.192
	After 2nd week	119.14 ± 10.03	111.00 ± 12.07	0.063
Knee Extension ROM	At baseline	14.85 ± 5.26	14.85 ± 6.92	0.975
	After 1st week	11.78 ± 3.35	13.71 ± 6.56	0.641
	After 2nd week	8.71 ± 1.93	12.50 ± 6.06	0.012
WOMAC scale	At baseline	68.92 ± 10.67	71.50 ± 613.32	0.578
	After 2nd week	51.14 ± 10.06	64.64 ± 14.25	0.008

DISCUSSION

Correlated results were noted in another study in which pain was significantly reduced in the group which received INIT technique for knee osteoarthritis (grade II,III), having illiotibial band tightness along with presence of trigger points in it (5). However, a study was reported in which pain was more reduced in the group which was treated by INIT group, applied on mechanical neck pain patient. This confirmes the effect of INIT technique in pain reduction that supports the effects of current study (19). Another RCT recommended the use of INIT technique for deactivating trigger points and for improving pain, range and quality of life by use of INIT technique as compared to use of muscle energy technique only which also confirms the results of present study (20). Congruent findings was noted in the study which applied INIT technique on trigger points of upper neck muscles. INIT technique treated group showed more reduction in pain, ROM improvement and quality of life improvement which proved the useful effects of this technique (21). Moreover, another study results goes inline with current study results with reduction in the pain intensity was noted immediately and then 25 hours after single treatment session which showed its importance in pain control (13). Another study investigated the effect of INIT technique and LASER applied on trigger points of upper trapezius. Equal reduction in pain was noted in both groups. The results of that study explain the role of INIT in pain control (22). By controlling knee pain, improving range and quality of life we delayed need for surgery. Through application of this technique on triggers points of quads, hams, gastrocnemius, adductors, tensor fascia lata muscle we gain further knowledge regarding its effect on knee ROM are the strengths of study. Small sample size, limited visit of patients in hospitals due to covid-19, exclusion of grade I knee osteoarthritis because more triggers were noted in chronic stages of knee osteoarthritis were the limitations of study. Further single application of this technique or combined with knee mobilization on knee osteoarthritis are the recommendations of study.

CONCLUSION

Both groups showed improvement but group which received INIT technique combined with conventional treatment showed better results. It proved INIT technique is effective for knee osteoarthritis treatment.

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