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ORIGINAL ARTICLE

Effectiveness of Obturator Nerve Mobilization for Knee Joint Pain in Young Females

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ABSTRACT

Background: Medial knee pain is reported due to adductor tightness in young females. Nerve supply of adductors of thigh is obturator nerve. Compression of obturator nerve is one of the reasons to generate medial knee pain.

Objectives: To evaluate the effect of obturator nerve mobilizationfor treating medial knee joint pain in young females.

Material and Methodology: A quantitative, randomized clinical trial was conductedcomprising of sample of 30 patients. Patients were allocated into control group and treatment group randomly by using lottery method. Hot pack and adductor release was given as baseline treatment in both groups. Treatment group received obturator nerve release in addition. Visual analogue scale, Q angle and lower extremity functional scale was used as outcome measures.

Results: Data was analyzed by SPSS V.20. Independent sample t-test was used for inter-group analysis, paired sample t-test and repeated measurement ANOVA test was used for intra-group analysis. Significant decrease in medial knee joint pain, Q-angle and lower extremity functional score was reported in treatment group with p value <0.05. Association of BMI with pain and Q angle was found non-significant with p value >0.05.

Conclusion: Obturator nerve neurodyanamics showed significant improvement in treating medial knee joint pain in young females. No association was found of BMI with pain and Q angle.

Keywords: Young adult, female, Obturator nerve, Nerve compression syndromes, Neurodynamics

INTRODUCTION

Obturator neuralgia is a disease in which pain is of radiating nature from area of obturator nerve to the inner area of thigh. Compression of obturator nerve in obturator canal can lead to nerve entrapment syndrome. Sometimes it is idiopathic in nature. The pain is localized mainly in inguinal region and anterior and medial side of thigh that passes to the inner side of knee in downward direction. Pain worsens while standing or in mono-pedal stance.[1]

Persistent groin and knee ache is a usual and frequently disabling problem induced in many athletes. Sports activities injuries to the hip and groin area had been cited in 5% to 9% of high faculty athletes. Groin ache amongst expert sports players has a predicted occurrence of 0.5% to 6%.[2]

Obturator nerve pathology cause continuous pain in the hip and thigh region. There are a lot of reasons like tendinitis, bursitis, osteitis pubis, fracture due to stress, hernias during sports activities, pubic pain in athletes which causes entrapment of obturator nerve. Symptoms of obturator nerve pathology includes groin pain, medial thigh pain, weak leg adduction on affected side sensory loss along medial aspect of affected leg and feeling of lack of propulsion during running activities.[3]

Tenderness inside proximal adductor canal is present by deep palpation, in addition to which pain is increased while the nerve is being stretched during multiple motions like; extension or lateral leg motions. Ache may be brought on via a pectineal muscle stretch which stretch the obturator nerve. Ache is also reproduced by resisted hip internal rotation called obturator sign.[4]

Loading of adductor compartment of thigh during rigorous training may give rise to injury and swelling in the area of adductor muscles, especially adductor longus muscle. Adductors tightness may lead to severe pain.[5] Knee pain was correlated with activities like sitting, standing, standing from sitting, squatting, stair climbing and stair descending.[6]

Q angle (quadriceps angle) suggest to indicate knee joint mal-alignment which is formed between the course of action of quadriceps muscles and the patellar tendon direction Mal-alignment of knee joint has been supposed due to the musculoskeletal & neurological problem of knee joint, hip joint and foot.[7]

Increased Q-angle leads to patello-femoral ache which in turn causes subluxation of patella.[8] It can develop with biomechanical problems like knee valgus. Reasons of knee valgus can be decreased power of abductors of hip. Treatment includes short term usage of painkillers, taping and exercise for trunk, hip and lower extremity. Patellar braces and foot orthosis are also used.[9]

Different types of treatments are used for obturator neuropathy i.e. conservative, medical and surgical treatments. Conservative treatment is performed to treat obturator neuropathy which includes rest, physical therapy with the help of modality like ultrasound, soft tissue mobilization, strengthening exercises of adductors and pelvic muscles, oral anti-inflammatory medications, corticosteroid injections and stretching exercises. On the other hand, surgical neurolysis or Needle EMG is performed for good outcomes. [10]

Medial Knee joint pain is prevalent in young females due to adductor muscle tightness. As adductors of thigh is supplied by obturator nerve. In young females due to tightness of adductors, obturator nerve gets compressed. A number of studies are available in improving knee joint pain and the strength of adductor muscles but a limited evidence is available on nerve component release in improving knee joint pain. So, the primary aim and objective of this study was to determine the effectiveness of obturator nerve mobilization for knee joint pain in young females. Secondary objective was to determine effect of obturator nerve release on Q angle and lower limb function. Tertiary objective of study was to explore association of BMI with pain and Q angle.

METHODOLOGY

A randomized clinical trial design study was conducted at The University of Faisalabad (TUF) using simple random sampling technique. The study protocol was reviewed and analyzed by the ethical board of The University of Faisalabad. A data collection letter was issued by the University before conducting research and consent was also obtained from the managers of the gym settings. After the study's synopsis was approved, data collection and analysis took 4 months.

Informed consent was taken from each participant for participation in research. Sample informed consent is attached below at the end of manuscript. A minimum sample of 30 patients

is required in experimental studies to explore the effects of any intervention and for the application of certain statistical tests.[11] Sample size was also determined to be 30 with the assistance of following formula by putting in values taken from previous published studies:[12]

$n= 2SD^2 (Z_{\alpha/2} + Z_{\beta})^2 /d^2$

*S.D= Standard Deviation, d= effect size= difference between the mean values, $Z_{\alpha/2} = Z_{0.05/2}$= 1.96 (from Z table), $Z_{\beta}= Z_{0.20}$ = 0.842 (from Z table) at 80% power.

Subjects were enrolled from The University of Faisalabad. 50 people underwent screening before being enrolled in the study. The study only included people who met the eligibility requirements. The inclusion criteria included females only, age range from 18-25 years, subjects having medial knee joint pain, and subjects having maximum medial knee pain score of 5 on VAS. Subjects with knee joint compression, knee osteoarthritis, history of knee injury, any sort of ligamentous/meniscal injury, nerve injury, sprain or strain, history of knee fracture, anxious and depressed were excluded.

There was no wash-out phase because analgesic-using subjects were not allowed to participate in the study. To avoid the impact of any extrinsic factor and simply acquire the results of the interventions offered, subjects who wanted to use analgesics or other therapies throughout the intervention period were excluded. In spite of patient's pain and disability scores no other adjuvant treatments were permitted to avoid the effects of confounding factors, only then changes in outcomes can be attributed to the provided treatments.

Subjects were from the selected screened sample were randomly allocated to control and treatment group by using lottery method for randomization. A group (n=15) was the active control group whereas the B group (n=15) was the treatment group.

If subjects are not blinded and they are informed about group assignment, behaviour and subjective responses of subjects to different outcome measures may be affected.[13] Due to importance of blinding on effects of intervention, in this study, patients were kept blind regarding their assigned therapy group. Patients were aware of the treatment they were receiving, but they were unaware of which group they belonged to or the treatment that the other group was receiving.

Both groups received baseline treatment, while B group received an additional treatment of obturator nerve release by obturator nerve neuro-dynamics along with baseline treatment. Both groups received total 8 sessions in 2 weeks. 4 consecutive sessions were given to each patient in 1 week.

Group A performed Baseline treatment of hot pack application and adductor release.[10] Hot pack was applied for 15-20 minutes[14] intensity of hot pack was according to patient's tolerance. Adductors of thigh was released by applying adductors stretch. Procedure of adductors stretch was side-lying position of patient, distal thigh was supported with arm and forearm of therapist. Patient's pelvis was stabilized by settling pressure on the opposite anterior iliac crest or by sustaining the opposite lower extremity in slight abduction and then hip was abducted to a feasible extent to stretch the adductors.[15] Intensity of adductor stretch was also according to patient's tolerance. Treatment was provided 4 days per week for 15-30 seconds and repeated for 2-4 times**.**[16]

Group B received both baseline treatment and obturator nerve release by obturator nerve neuro-dynamics. Technique was applied with patient in side-lying, slump in side lying position, like head flexion, trunk flexion. Treatment leg was the top leg. Leg and knee flexion to opposite leg. Hip extension, abduction, external rotation and knee flexion to the treatment limb.[17] Intensity and duration of nerve mobilization was according to patient's tolerance. Frequency was 15-20 repetition 4 times per week. Duration of treatment was 2 weeks.[18]

Amongst multiple possible outcome measures options available for measuring effect of intervention on medial knee joint pain. As outcome measures, VAS, goniometer, and LEFS were chosen based on our non-invasiveness, feasibility, validity, and reliability. So, VAS was used as a primary outcome measurement tool to asses medial knee joint pain. Universal Goniometer and Lower extremity function scale (LEFS) were used as secondary outcome measurement tool to asses Q angle and lower extremity function respectively. VAS measurements were taken pre-treatment (at baseline), post treatment 1st week and post-treatment 2nd week. Goniometer and LEFS readings were assessed pre-treatment (at baseline) and post-treatment 2nd week.

The data was managed and analyzed using SPSS version 20. The presentation of the data included Mean+S.D and p-values. Significance level was defined as a p value of ≤ 0.05. Independent sample t-test was used for inter-group analysis of medial knee joint pain, Q angle of knee joint and LEFS. Pearson correlation was used to check association of BMI with pain and Q angle.

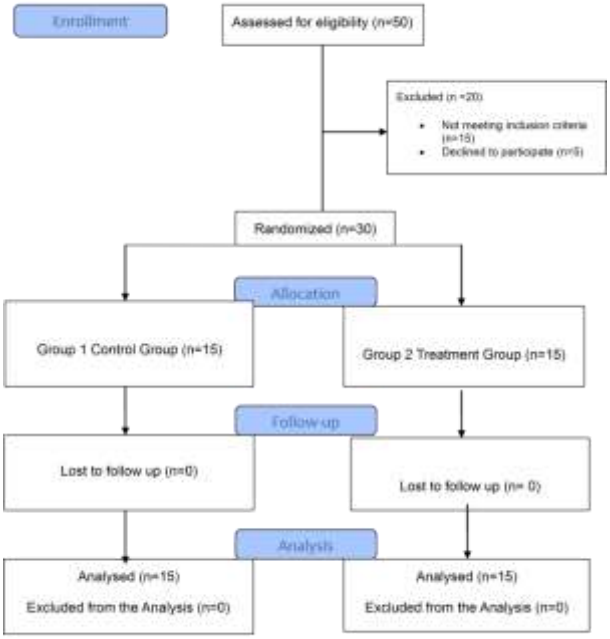

Fig 1: Consort Flow Diagram

RESULTS

Mean+Standard deviation of age of group 1 and 2 was 21.40+2.38 and 21.20+2.90 respectively. Minimum value of age in sample was 18 and maximum value of age in sample was 25. Mean and Standard deviation of BMI of sample was 1.20+ .80.

Independent sample t-test was used for inter-group analysis of medial knee joint pain, Q angle of knee joint and LEFS. Pearson correlation was used to check association of BMI with pain and Q angle.

Table 1:

Variables	Time Points	Mean+ S.D		
		Group 1	Group 2	p. Value
VAS	Pre-Treatment	4.60+ .82	4.93+ 1.03	0.338
	1st Week Post Treatment	3.93+ .70	2.80+ 1.20	0.005
	2nd Week Post Treatment	3.13+ .83	1.13+ .99	0.000
Q- Angle	Pre-Treatment	15.80+ 4.61	15.86+ 4.47	.968
	2nd Week Post Treatment	15.23+ 4.36	13.70+ 2.85	.266
LEFS	Pre-Treatment	46.93+ 9.05	49.00+ 11.72	.593
	2nd Week Post Treatment	61.40+ 5.32	73.13+ 5.22	.000

Table 1 showing between group comparison for mean change in VAS, Q- Angle and LEFS at different time points.

*VAS= Visual Analogue Scale, * Q- Angle = Quadriceps Angle, *LEFS= Lower Extremity Functional Scale, *S.D= Standard Deviation, *p-value= Probability value

The above table demonstrates the between group comparison for VAS, Q- Angle and LEFS which were examined by applying Independent Sample t test. Results demonstrated significant difference in VAS score at 1st week post treatment and 2nd week post treatment between 2 groups with p value being < 0.05. Likewise, results demonstrated significant difference in LEFS score at 2nd week post treatment between 2 groups with p value being < 0.05. Significant difference was observed in treatment group (Group B) for both VAS and LEFS scores at post treatment readings.

Whereas, results showed no significant difference in Q angle in at 2nd week post treatment between both groups with p value being greater than 0.05. Both groups were found equally effective in improving Q angle of patients.

Table 2:

Variables	Mean+ S.D	p. Value
BMI	1.20+ .80	
Pre-Treatment VAS	4.76+ .935	0.563
Pre-Treatment Q Angle	15.83+ 4.46	0.136

Table 2 showing Pearson Correlation of BMI with VAS and Q Angle.

*VAS= Visual Analogue Scale, * Q- Angle = Quadriceps Angle, *S.D= Standard Deviation, *p-value= Probability value

The table stated above shows the Pearson Correlation of BMI with pre-treatment VAS and Q Angle. Results demonstrated no association of BMI with pre-treatment VAS and Q Angle with p value being greater than 0.05.

DISCUSSION

Current study demonstrated statistically significant improvement in VAS and LEFS scores in Obturator Nerve Mobilization group for knee joint pain in young females. Another study evaluated the effect of neural mobilization for the knee pain, but the study differs from our study with regards to side of knee undertaken for analyzing the effects of treatment. The current study evaluated nerve mobilization for medial knee pain in healthy females, whereas the study by Arulsingh, et al. (2021) determined effectiveness of neural mobilization in combination with posture corrective exercises in a lateral knee pain patient.[19]

The study by Arulsingh, et al. (2021) was a case report in which patient was treated with neural mobilization, supplemented with postural correction exercises. The numeric pain rating scale (NPRS) and the knee society scale were used to assess the results (KSS). The patient reacted favourably to the combination of neural mobilization and posture correction activities.[19] The study has favoured the results of current study by showing that aberrant neurodynamics might contribute to knee pain and patients with lateral knee pain due to improper neurodynamics may benefit from neural mobilization. Another study had consistent findings with our study in which neurodynamics were found effective in treating neuropathy.[18]

Results of the current study showed decrease in Q angle after applying treatment in both control and treatment group. Multiple researches has assessed Q angle of knee joint in patients with quadriceps or hamstring muscle weakness and imbalance. Q angle was also stated decreased in quadriceps and hamstring muscle weakness after treatment in different researches. A research supported these findings by giving a statement that decrease in Q angle in exercise group was greatly significant than that in control group in patients with patellofemoral pain syndrome.[20] Another study stated that Q angle changes with the body weight. Q angle was found altered between subjects with normal weight and obese subjects.[21]

Current study has found no association between BMI and pain, and BMI and q angle. Literature supports relationship between BMI, pain and q angle but in present research has shown non-significant results. Reason of this non-significant result may be a limited age group or less number of study participants. Another study found no association between radiographic features and clinical assessment in patients with knee osteoarthritis. No link was found between BMI, knee pain, Q angle and function of limb in knee osteoarthritis patients.[22]

A research was performed to see connection between BMI, Waist to Hip Ratio, and Q-Angle in people with primary OA knees. Results demonstrated significant positive association between BMI and Q-Angle, whereas an insignificant positive correlation was found between BMI and WHR. Insignificant negative correlation was found between WHR and Q-Angle. Prakash, 2017

Another research found no correlation between Q angle and BMI > 30 in females. However waist to hip ratio was found moderately negatively correlated with Q angle in females with BMI > 30.[23]

The study limitations were that only females were included, specific study setting, small sample size, restrictions due to COVID-19 and not generalizable to whole population.

Future recommendations are that further studies large sample size should be taken, more outcome measures could be analyzed or more treatment options could be explored. New researches can work on other causes of knee pain in young females.

CONCLUSION

Combination of hot pack, adductors stretch with obturator nerve neurodyanamics showed significant improvement in pain, Q angle of knee and lower extremity functional scores in young females with medial knee joint pain. No association of BMI was found with pain and Q angle.

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