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Short term effects of instrument assisted soft tissue mobilization on pain and activities of daily living in subjects with patellofemoral joint osteoarthritis – A randomized controlled trial.

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Abstract

Aim: To study the effectiveness of Instrument assisted soft tissue mobilization using M2T blade in Osteoarthritis of Patello-Femoral joint to reduce pain and improve Activities of daily living.

Objectives: To compare the effectiveness of M2T blade and conventional physiotherapy with Conventional physiotherapy alone on pain and activities of daily living in subjects with patellofemoral joint osteoarthritis.

Method: A Randomized controlled trial, 34 Patellofemoral osteoarthritis subjects were, divided in 2 groups. All the subjects were evaluated for Pain, Physical functioning of joints and the range of motion and outcome measures such as VAS, WOMAC and ROM which were noted on Day 1 of intervention and Day 7, both Pre and Post treatment.

Results: Analysis was done using T-test, Subjects of Group A received M2T blade and Conventional physiotherapy showed significant improvement as compared to the subjects of group B which received Conventional physiotherapy only.

Conclusion: Present study concluded that M2T blade along Conventional Physiotherapy was effective in improving VAS, WOMAC and ROM as compared to conventional Physiotherapy group with patellofemoral osteoarthritis subject.

Keywords: Patellofemoral osteoarthritis; knee pain; M2T; IASTM; WOMAC; VAS; Knee ROM; Obesity.

Introduction

The Knee Joint is the largest synovial joint in the body. It is a Hinge type of joint. It consists of

- 1) Articulation between the femur and tibia which is weight bearing.
- 2) Articulation between the Patella and the Femur which allows the pull of Quadriceps Femoris muscle to be directed anteriorly over the Knee to the Tibia without the tendon wear¹.

Osteoarthritis (OA) is a degenerative joint disease which is progressive destruction of the articular cartilage and the formation of bone at the margins of the joints². It is the most common form of degenerative joint disease, affecting 15% to 40% of people aged 40 and above³. Osteoarthritis is the most common form of arthritis and extremely prevalent among individuals over the age of 40⁴.

The prevalence of Osteoarthritis in the rural and urban areas ranges from 33% to 46% of older adult population, where females are more affected than males⁵. One estimate of the lifetime risk of developing symptomatic knee OA was 40% in men and 47% in women, with higher risks among those who are obese. Age- and sex-standardized incident rates for symptomatic hand, hip, and knee OA have been estimated to be 100, 88, and 240 cases per 100,000 person-years, respectively, with incidence rates rising sharply after age 50, and leveling off after age 70⁶.

The Patellofemoral joint is the most common joint involved in Osteoarthritis. The patients with patellofemoral joint involvement are always reported to have more pain than those without patellofemoral joint involvement⁷.

The primary complaints of patients suffering from osteoarthritis are pain, stiffness, instability and loss of function. In addition to this, impaired muscle function is frequently observed in patients with osteoarthritis of the knee. It was found that 80% of patients with knee osteoarthritis reported problems related to muscle function, strength, endurance and coordination⁸.

Risk factors include ageing, female gender, being overweight, prior knee injury, repetitive joint stress, Proprioceptive impairments, Positive family history and muscular weakness^{9,10,11}.

The standard grading followed for Osteoarthritis is proposed by Kellgren and Lawrence which is a 5 point classification system for grading radiographic changes in both clinically and for purpose of research¹². Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is the functional scale used for osteoarthritis of the knee and hip including pain, stiffness and physical functioning of the joints. Physiotherapy intervention in the form of electrotherapy as such: TENS and IFT. Exercise therapy such as Stretching of Hamstrings and T.A, Strengthening and stability exercises, Mysiofacial release around the joint, quadriceps and T.A, Other adjuncts like orthoses, splints, tapping, blade and braces can also be prescribed for immobilizing the joints and help reduce pain and swelling, functional splints can be given to increase functional activities, Rest can also be advised which will reduce pain and swelling, Range of motion and Flexibility exercises are advised for maintaining and increasing Range of motion and reducing pain, strengthening exercises are also given in order to increase muscle strength¹³.

In present study instrument assisted soft tissue mobilization M²Tblade with conventional physiotherapy as an adjunct was used. M²T blade is a latest invention which helps us to release myofascial pain using the M²T blade. M²Tblade was first invented in Canada by Mr. Adam Bogar and was used to reduce pain and increases the range of motion of the particular joint.

A method of designing highly loaded blades to give a specified distribution of swirl is presented. The blade consists of 8 treatment plane. There are many studies that have been done on knee joint and reduction in the pain at knee joint due to osteoarthritis but however, there are no studies which suggest effectiveness of M²T blade in osteoarthritis of the patellofemoral joint.

Hence the present study is done to validate the short term effects of M²T blade Instrument Assisted Soft Tissue Mobilization on pain and daily living activities in subjects with patellofemoral joint osteoarthritis.

Materials and Methods

Data was collected from subjects of Belagavi city, 34 subjects of patellafemoral osteoarthritis were treated and analyzed.

Inclusion Criteria:

- Subjects with Osteoarthritis of Patellofemoral joint.
- Both males and females.
- Age between 40 years old.
- Subjects willing to participate in the study.

Exclusion Criteria:

- Subjects with history of lower extremity injury in past 3 months
- Any fracture or surgery done for pelvis, hip or knee.
- Any neurological symptoms.
- Any recent knee reconstructive surgery.
- Burns of lower extremities

Intervention:

All the subjects were divided into 2 groups via Chit Method:

GROUP A: M2T Blade with Conventional Physiotherapy.

GROUP B: Conventional Physiotherapy.

The study was carried out for 7 days with 3 sessions per subject and outcome measures were measured on the 1st day and on the 7th day.

Group A (M2T blade with Conventional Physiotherapy)

Group A was be given M2T Blade along with conventional Physiotherapy.

M2T Blade

1. Site of treatment: Inferior to the Patella on the Patellar tendon
Patient Position: Supine lying with the affected Hip-knee in 15° Flexion
2. Site of treatment: Hamstrings and Gastrocnemius
Patient Position: Prone lying with hip and knee in extension
3. Site of treatment: Psoas Major and Quadriceps
Patient Position: Supine lying with hip and knee in extension

This treatment is given for 30 seconds.

Cryotherapy is given after the treatment session to avoid bruising and reduce pain



Photo 1: M2T Blade



Photo 2: M2T blade given on Patellofemoral tendon.

Conventional Physiotherapy

- Isometrics exercises of Quadriceps: - By placing a towel roll below the knee and press and hold for 20 seconds, 5 sets.
- Isometrics exercises Hamstrings: - By placing a towel roll below the knee and press and hold for 20 seconds, 5 sets.

- Wall sits for 10 seconds, 5 sets.
- Hamstring Stretch: - Patient is in Supine position, the affected leg is raised straight and pulled towards him using a towel, This is maintained for 10 seconds and repeated for 10 sets.



Photo 3: Wall slides.

Outcome Measures:

- WOMAC Score
- Visual Analogue scale
- Range of motion of knee.

Outcome measured were noted pre and post intervention each session.

Objectives:

- To study the short term effectiveness of Instrument assisted soft tissue mobilization using M2T blade on pain and activities of daily living (WOMAC) in subjects with patellofemoral osteoarthritis.

To compare the short term effects of Conventional Physiotherapy exercises and M2T blade Instrumented Assisted Soft Tissue Mobilization on pain and activities of daily living (WOMAC) in subjects with patellofemoral osteoarthritis

Results

Group distribution:

Total number of subjects in Group A were 17 (50.00%) and Group B were 17 (50.00%) (Table 1)

Table 1: Subjects distribution in group A and group B.

Study Group	Frequency	Percentage
Group A	17	50.00%
Group B	17	50.00%

Age distribution:

Subjects in the study of Group A had mean age of 62.65 ± 8.14 and Group B had mean age of 59.06 ± 5.74 . 'P' Value was 0.147. (Table 2)

Table 2: Age Distribution Comparison in Group A and group B.

Parameter	Study Group		P value
	Group A(N=17)	Group B(N=17)	
Age	62.65 ± 8.14	59.06 ± 5.74	0.147

Gender distribution:

Total number of Male subjects were 11 (64.70%) and Female were 6 (35.29%) in Group A.

The total number of Male subjects were 6 (35.29%) and Female were 11 (64.70%) in Group B. The 'P' Value was 0.086. (Table 3)

Table 3: Gender distribution comparison in group A and group B. (N=34)

Gender	Study Group		P-value
	Group A	Group B	
Male	11 (64.70%)	6 (35.29%)	0.086
Female	6 (35.29%)	11 (64.70%)	

BMI distribution:

BMI of Group A was 26.56 ± 1.74 ; similarly that of Group B was 28.87 ± 2.47 . 'P' Value was 0.003. (Table 4)

Table 4: Comparison of mean BMI across study groups (N=34)

Parameter	Study Group		P value
	Group A(N=17)	Group B(N=17)	
BMI	26.56 ± 1.74	28.87 ± 2.47	0.003

Outcome measures**Comparison of pre-post VAS by using T-Testing:**

Group A Pre VAS score on Day 1 was 1.41 ± 0.62 , similarly that of Group B was 0.76 ± 0.66 . The 'P' Value was 0.006.

Group A Post VAS score on Day 7 was 1.59 ± 0.79 , similarly that of Group B was 0.82 ± 0.39 . The 'P' Value was 0.001, which was highly significant.

Comparison of Pre-Post WOMAC across study groups:

Group A Pre WOMAC score on Day 1 was 2.49 ± 1.68 , similarly that of Group B was 1.47 ± 0.87 . 'P' Value was 0.003.

Group A Post WOMAC score on Day 7 was 2.47 ± 1.66 , similarly that of Group B was 1.47 ± 0.51 . 'P' Value was 0.024.

Comparison of Pre-Post ROM across study groups:

Group A Pre ROM score on Day 1 was -6.53 ± 4.03 , similarly that of Group B was -2.82 ± 1.63 . 'P' Value was 0.001.

Group A Post ROM score on Day 7 was -4.53 ± 1.70 , similarly that of Group B was -1.71 ± 1.65 . 'P' Value was <0.001 . (Table 5)

Table 5: Comparison of mean of Change (Pre-post) parameters across study groups (N=34)

	VAS		WOMAC		ROM	
	Pre	post	Pre	post	Pre	post
Group A	1.41 ± 0.62	1.59 ± 0.79	2.94 ± 1.68	2.47 ± 1.66	-6.53 ± 4.03	-4.53 ± 1.70
Group B	0.76 ± 0.66	0.82 ± 0.39	1.47 ± 0.87	1.47 ± 0.51	-2.82 ± 1.63	-1.71 ± 1.65
P values	0.006	0.003	0.001	0.001	0.024	0.001

Discussion

Present experimental study was conducted to compare the short term effects of Instrument assisted soft tissue mobilization on pain and daily living activities in subjects with patellofemoral joint osteoarthritis.

There were two treatment groups, Group A received M2T Blade with Conventional physiotherapy in form of static quadriceps, static hamstrings, hamstrings stretching and wall sit ups; whereas Group B received conventional physiotherapy alone.

The outcomes measured were VAS, WOMAC and ROM.

Present study total number of subjects were 34, 17 subjects in each group, allocation was done by chit method, Group A had 11 males and 6 Females where Group B had 6 Males and 11 males.

A study done by Huaqing Zheng and Changhong Chen, it concluded that Obesity was a risk factor for knee OA¹⁴. Similar trend was seen in our study as majority of subjects were overweight.

Osteoarthritis is extremely prevalent among individuals over the age of 40⁴, similarly in our study mean age of group A was 62 and Group B was 59.

In the present study the outcome measures were VAS, ROM and WOMAC which was analyzed on alternative days for 7 days. Pre and Post analysis was done on 1st day and 7th day.

Study done to analyze IASTM fascial abrasion technique to foam rolling on hip and knee ROM. They assessed the ROM immediately post intervention and 24 hours of follow up was done. The results notified immediate improvement in ROM compared to the controlled group and joint ROM after 24 hours was maintained¹⁵. Similar effects were seen in ROM in the present study.

The stretch applied on the tight fascia in Myofascial release is maintained for 90-120

seconds shows lengthening of tight fascia¹⁶. Likewise in this study the adhesions were broken and fascia was released by stretching the tight fascia using M2T blade.

The length of the fascia is restored after myofascial release and there is relieve of pressure over the pain sensitive areas like the blood vessels and nerves, these results in increased mobility and alignment of the joint¹⁶. Likewise there was reduced tightness around the knee joint, which resulted in reduced pain n increased the range of motion of the knee joint. Blood circulation is further promoted by myofascial release which causes controlled microtrauma and the numbers of fibroblasts are increased¹⁷. In the present study there is increased blood flow to the areas treated using M2T blade as it causes Petechiae which is controlled microtrauma.

Present study done proved that M2T blade along with Conventional physiotherapy showed statistical significant improvement as compared to conventional physiotherapy only.

Limitations of the study

In the present study the limitations were:

1. Limited duration of the study less.
2. Follow ups
3. Small sample size
4. Duration of the study was short.
5. Activity level of subjects was not taken into consideration.

Scope for further study

- Studies with longer duration are recommended with longer follow-up period to assess long term benefits.
- Conduct the study with larger sample size.
- Further studies can be done with different grades of osteoarthritis.
- Multicentre trial can be employed.
- Long follow- up studies can be planned.
- Other outcome measures like walking impairment questionnaires in OA subjects along with functional capacity of the subjects can be taken into consideration for further studies.

Conclusion

Present study concluded that M2T blade IASTM with conventional Physiotherapy and Conventional physiotherapy alone showed improvement in VAS, WOMAC and Knee ROM. Instrument Assisted Soft Tissue Mobilization with Conventional Physiotherapy showed statistical significant improvement in VAS, WOMAC and Knee ROM score.

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Conflict of interest: none.

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