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Effect of Yoga Therapy to improve Function and Level of Pain in patients with Patellofemoral Pain Syndromes

A Randomized Controlled Trial

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Abstract:

Background: Patellofemoral pain is one of the most common clinical conditions presenting to clinicians who treat musculoskeletal conditions. Patellofemoral pain syndromes is a general terminology which suggests that damage exists beyond the articular cartilage. Patellar malalignment and/or abnormal patellar tracking is thought to be one of the primary precursors of patellofemoral joint pathology. Yoga is an ancient Indian science and way of life which talks about the origin of diseases. The dynamic component of asana strengthens the musculoskeletal framework and the static component relaxes the neuromuscular framework. Many studies have been conducted focusing on different open chain and closed chain kinetic exercises, manual therapy, dry needling, patellar taping and footwear correction. But no significant study has focused on the wholistic effects of yoga in patellofemoral pain syndromes. Hence, primary aim of this study is to find out Effect of Yoga Therapy in Patellofemoral pain syndromes.

Methodology: 63 subjects fulfilling the inclusion and exclusion criteria were randomly allocated into two groups. Group A participants were given Yoga Therapy and Group B participants were given conventional physiotherapy exercises. The outcome measures included in the study were Numerical Pain Rating Scale (NPRS), Knee Osteoarthritis Outcome Survey-Patellofemoral Subscale (KOOS-PF) and Medical Outcome Study Questionnaire Short Form 36 (SF-36).

Results: Independent t-test was used to find out the effectiveness of Yoga Therapy compared to that of conventional physiotherapy in Patellofemoral Pain Syndromes. Results for NPRS and KOOS-PF showed that p-value was less than 0.0001 that is highly significant at 95% confidence limits. For SF-36, physical function, energy and emotional wellbeing components showed highly significant p-vale<0.0001; social function, pain and general health components showed significant p-value<0.05 whereas role limitation due to physical function and emotional problem components showed no significant difference.

Conclusion:

Results of the present study indicate that an integrated Yoga Therapy program is effective to reduce level of pain and improve function in patients with Patellofemoral pain syndromes compared to that of conventional physiotherapy exercises.

So, Yoga Therapy can be used as an adjunct to conventional physiotherapy exercises in management of Patellofemoral pain syndromes.

Index terms: Patellofemoral Pain Syndromes, Yoga Therapy, Conventional Physiotherapy.

I. INTRODUCTION

Patellofemoral pain is one of the most common clinical conditions presenting to clinicians who treat musculoskeletal conditions.[2,3,4,5,6,7,8] Patellofemoral pain syndromes is a general terminology which suggests that damage exists beyond the articular cartilage.[1]Cartilage is aneural and therefore cannot be the cause of pain.[9] Instead patients with patellofemoral pain can experience discomfort from damage to the subchondral bone, the synovial membrane, and ligamentous and musculotendinous structures.[1]

Patellar malalignment and/or abnormal patellar tracking is thought to be one of the primary precursors of patellofemoral joint pathology.[10,11,12,13] One proposed mechanism for abnormal patellar tracking is an altered vastus medialis firing relative to vastus lateralis.[1,14] The presence of tight iliotibial band can limit patella's ability to shift medially during flexion, contributing to increased stress under the lateral facet of patella.[15] With increased knee flexion, the iliotibial band exerts an even greater lateral pull on the patella that results in a progressive lateral tilting.[15] The increased lateral tilt could focus the patellofemoral load on lateral facet, increasing joint stress.[1] The tibiofemoral frontal plane deviation of genu valgum increases the obliquity of femur and, concomitantly, the lateral obliquity if the pull of quadriceps.[1]

Various authors have suggested that hip weakness may be an impairment associated with patellofemoral pain syndromes, because poor hip control may lead to abnormal lower extremity or patellofemoral motions.[16,17,18,19] Theoretically weakness of

hip abductors and external rotators may be associated with poor control of eccentric femoral adduction and internal rotation during weight bearing activities, leading to misalignment of the patellofemoral joint as femur medially rotates underneath the patella.[17,20] The medially oriented femoral sulcus carries the patella medially and increases the Q-angle by increasing the obliquity of the pull of the quadriceps on the patella.[1]

Likewise, in lateral tibial torsion there is an increased Q-angle due to the increased obliquity of the patellar tendon. When medial femoral torsion and lateral tibial torsion coexist, the Q-angle will increase substantially, resulting in substantial lateral force on patella. Excessive or prolonged pronation of the foot can contribute to excessive or prolonged medial rotation of the lower extremity that moves the patella medially increasing the Q-angle and promoting a greater lateral force on patella in a way similar to that of medial femoral torsion.[1]

Some other factors which can lead to patellofemoral pain syndromes are the tight heel cords which may result in gait with the knee flexed, which can put extra pressure on the patellofemoral joint.[21] Tight hamstrings result in increased knee flexion, which can lead to the need for more ankle dorsiflexion. If no further dorsiflexion is possible, the foot pronates to compensate, thus increasing the dynamic Q-angle.[21]

Yoga is an ancient Indian science and way of life which talks about the origin of diseases.[23] The texts describe about how the suppressed emotions (called adhis) percolate into the physical body manifesting as diseases (adhija vyahdhis). These texts go on to describe the conceptual basis for reversibility of mind body disease (prasava-pratiprasava model) and offer the necessary principles to design specific postures, breathing and meditative techniques for different diseases.[24] Hence, yoga is fast advancing as an effective therapeutic tool in physical, psychological and psychosomatic disorders.[25]

Yogasana is a psychophysical posture where mind body concentration is must. The dynamic component of asana strengthens the musculoskeletal framework and the static component relaxes the neuromuscular framework.[26]

The physical benefits of yoga are[26]:

- Relaxes the muscles and relieves muscular tension.
- Regulates the breath and increases pain tolerance.
- Lubricates the joints and reduces painful stiffness.
- Improves the pliability of soft tissues around joints.
- Strengthens the antigravity mechanism for erect posture.
- Reduces the levels of blood lactate and prevents fatigueness.
- Reconditions the peripheral nerves thereby improving pain perception.

The mental benefits of yoga are[26]:

- Brings about equilibrium in overall functioning including ego, emotions, behaviour and perception.
- Renders the mind more balanced and steady and aims at releasing tension working at the levels of consciousness.

Many studies have been conducted focusing on different open chain and closed chain kinetic exercises, manual therapy, dry needling, patellar taping and footwear correction. But no significant study has focused on the wholistic effects of yoga in patellofemoral pain syndromes. Hence, primary aim of this study is to find out Effect of Yoga Therapy in Patellofemoral pain syndromes.

METHODOLOGY

A. STUDY DESIGN: Randomized controlled trial.

B. STUDY SETTING: Outdoor Physiotherapy Department of S.S.G. Hospital, Vadodara.

C. STUDY DURATION: April 2018 to April 2019

D. STUDY POPULATION: Patellofemoral pain patients referred to O.P.D.16 (Department of Physiotherapy) S.S.G. Hospital, Vadodara; fulfilling the inclusion and exclusion criteria.

E. SAMPLE SIZE: As it was a time a time bound study, a total of 70 subjects fulfilling the inclusion and exclusion criteria, were randomly allocated into 2 groups by table of random numbers method generated by the computer. During the study,7 patients were lost to follow up.
So, a total of 63 subjects participated in the study, 32 in the interventional group and 31 in the control group.

F. INCLUSION CRITERIA:

1. Anterior or retro patellar knee pain in at least two of the following activities: prolonged sitting, stairs, squatting, running, kneeling and hopping/jumping.
2. Pain on patellar palpation.
3. Pain while stepping from a 25-cm step or during double leg squat.
4. Symptoms for at least one month.
5. Insidious onset of symptoms unrelated to a traumatic accident.
6. Age group 40-60 years.

G. EXCLUSION CRITERIA:

1. A recent history (within 3 months) of knee surgery, a history of patellar dislocation/subluxation, or clinical evidence of meniscal lesion, ligamentous instability, traction apophysitis around the patellofemoral complex and patellar tendon pathology.
2. Patients on corticosteroid medication use and pregnancy.
3. Any severe neurological, cardiopulmonary or musculoskeletal impairments other than patellofemoral pain syndromes.

H. MATERIALS

- Consent Form (Annexure- III)
- Data Collection Sheet (Annexure-V)
- Universal Goniometer
  - 10" Full Round 360° Protractor Scale
  - 8" half round 180° Protractor Scale
- Measure Tape
- Thread
- Plinth, Pillow
- Markers, Pen, Pencil, Eraser
- Stature Meter
- Weighing Scale
- Mat for Intervention

I. ETHICAL CLEARANCE: In the act of research consists of human subjects, ethical clearance was obtained from Institutional Ethics Committee for Human Research (IECHR), S.S.G. Hospital, The Maharaja Sayajirao University, Baroda.

J. DATA COLLECTION PROCEDURES AND INTERVENTIONS AND ITS METHOD:

- Patellofemoral pain patients referred to Outdoor Physiotherapy Department of S.S.G. Hospital, Vadodara fulfilling the inclusion and exclusion criteria were included.
- A written and informed consent about enrollment in the study maintaining adequate privacy and confidentiality was taken from all patients included in the study.
- Then the patients were randomized into two groups, group A and group B using table of random numbers method generated by the computer. Group A received Yoga Therapy and Group B received the conventional physiotherapy.
- A clinical history and a complete Physical and Functional Physiotherapy examination was done in each case.
- Patient's outcome measures were taken before and at the end of 4 weeks of intervention/ treatment. All measures used were valid and shown to have acceptable reliability.

OUTCOME MEASURES

1. **Numerical Pain Rating Scale:** The Numerical Pain Rating Scale is one of the most widely used scales to assess self-reported pain intensity in patients suffering from any musculoskeletal pain. [27]

2. **KOOS Patellofemoral subscale (KOOS-PF):** KOOS-PF scale has been designed for patellofemoral pain and osteoarthritis. It is a 11-item scale which focuses on pain during activities that load the patellofemoral joint. [28]

3. **Medical Outcomes Study Questionnaire Short Form 36 Health Survey (SF-36):** The SF-36 questionnaire is a self administered questionnaire containing 36 items. It measure health on eight multi-item dimensions, covering functional status, well being and overall evaluation of health.[29]

INTERVENTION PROTOCOL

- Group A received Yoga Therapy program.
- The overall number of training sessions in the implemented program was 24, with a frequency of 6 times per week, and duration of 30 minutes for each session for 4 weeks [30].
- The structure of the session was: Warm Up[25], Yogasanas [31], Relaxation and breathing techniques [32]
- The progression of Yoga Therapy will be in four stages**.**

Table 2: Intervention Protocol.

STAGES	YOGA THERAPY	TIME
STAGE 1	Shithilikarana vyayama(loosening exercises), Tadasana, Dandasana, Jaanushirasana, Relaxation(Makarasana) and breathing.	30 min
STAGE 2	Shithilikarana vyayama(loosening exercises), Tadasana, Dandasana, Jaanushirasana, Ardha Shalabhasana,Sarpasana,Uthitasana, Setubandhasana, Relaxation(Makarasana) and breathing.	30 min
STAGE 3	Shithilikarana vyayama(loosening exercises), Tadasana, Dandasana, Jaanushirasana, Ardha Shalabhasana, Sarpasana, Uthitasana, Setubandhasana, Utkatasana, Veerbhadrasana II, Relaxation(Makarasana) and breathing.	30 min
STAGE 4	Shithilikarana vyayama(loosening exercises), Tadasana, Dandasana, Jaanushirasana, Ardha Shalabhasana, Sarpasana, Uthitasana, Setubandhasana, Utkatasana, Veerbhadrasana II, Veerbhadrasana I, Relaxation(Makarasana) and breathing.	30 min

Warm up: Shithilikarana Vyayama (loosening exercises)[33]

It is particularly useful for eliminating energy blockages in the joints and outer extremities of the physical body, and works on the pranic and mental bodies as well. The practices may be performed in three ways:

a. With awareness of the actual physical movement
b. With awareness and integrated breathing
c. With awareness of the movement of prana in the body.[33]

Figure 4: Yoga Sukshma Vyayama

Ankle toe movements and Ankle circumduction

Alternate knee flexion and extension

Half butterfly

Wrist flexion and extension

Elbow flexion and extension

Shoulder circumduction

- Structured 4 week yogasanas were given in progression to the patients.

- Holding poses builds strength by engaging muscles in isometric contraction. Moving joints through their full range of motion increases flexibility while standing poses promote balance by strengthening stabilizing muscles and improving proprioception to reduce falls. [34]

Figure 5: Stage 1 Asanas

Dandasana

Jaanushirasana

Makarasana

Tadasana

Figure 6: Stage 2 Asanas

Setubandhasana

Ardha shalabhasana

Sarpasana

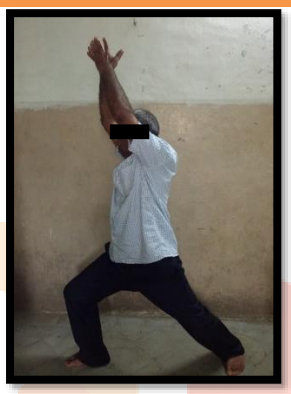
Uttithasana

Figure 7: Stage 3 Asanas

Utkatasana

Veerbhadrasana-2

Figure 8: Stage 4 Asanas



Veerbhadrasana-1

Group B was given Conventional Physiotherapy exercises which included ankle pump exercises, stretching of hamstrings, iliopsoas and gastrosoleus, static quadriceps, supine straight leg raises, end range extension, side lying abduction and patellar medial glide.[35]

RESULTS

All the statistical analysis was performed using MedCalc statistical software Version 19 (trial version).

Table 3: Study variables at baseline

Characteristics	Variables	Group A n (%)	Group B n (%)
Total	n	32	31
Gender	Male	15 (47%)	10 (32%)
	Female	17 (53%)	21 (68%)
Knee joint Affection	Unilateral	21 (66%)	23 (74%)
	Bilateral	11 (34%)	8 (26%)
Leg Dominance	Right	25 (78%)	25 (81%)
	Left	7 (22%)	6 (19%)

INTRAGROUP COMPARISON:

Table 4: Intragroup comparison of NPRS Scores using paired t – test.

	NPRS			
	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre - Score	Post – Score	Pre - Score	Post - Score
N	32	32	31	31
Mean	5.7531	2.2469	5.7677	4.2161
SD	0.7383	0.8886	0.5211	0.6267
p value	< 0.0001		< 0.0001	

Graph 4: Intragroup comparison of NPRS Scores pre and post intervention.

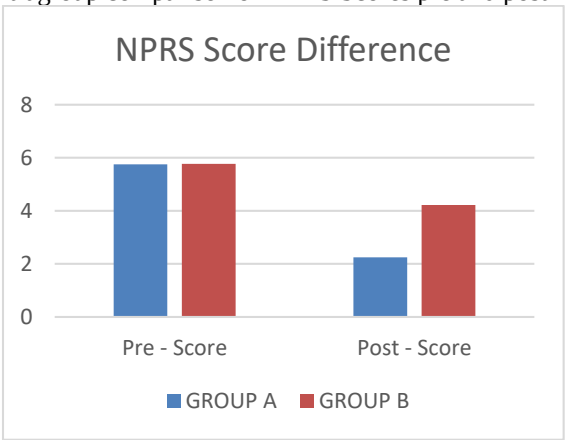


Table 5: Intragroup comparison of KOOS-PF Scores using paired t – test.

KOOS – PF				
	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre - Score	Post - Score	Pre - Score	Post - Score
N	32	32	31	31
Mean	44.3175	85.3700	44.3542	65.8355
SD	7.9352	5.9688	6.2064	6.0553
p value	< 0.0001		< 0.0001	

Graph 5: Intragroup comparison of KOOS-PF Scores pre and post intervention.

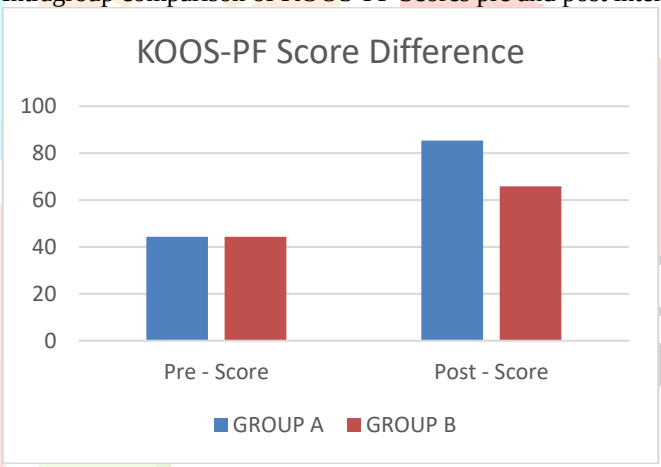


Table 6: Intragroup comparison of SF-36 domain Physical Function Scores using paired t – test.

SF-36 domain PHYSICAL FUNCTION				
	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre - Score	Post - Score	Pre - Score	Post – Score
N	32	32	31	31
Mean	42.9687	92.6562	41.4516	72.4194
SD	12.1057	8.1304	8.1847	7.2882
p value	< 0.0001		< 0.0001	

Table 7: Intragroup comparison of SF-36 domain Role limitation due to Physical Function Scores using paired t – test.

SF-36 domain Role limitation due to PHYSICAL FUNCTION				
	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre - Score	Post - Score	Pre - Score	Post – Score
N	32	32	31	31
Mean	71.0937	100.0000	67.7581	94.3548
SD	39.7113	0.0000	43.8556	19.0500
p value	P = 0.0003		P = 0.0006	

Table 8: Intragroup comparison of SF-36 domain Role limitation due to Emotional problem scores using paired t – test.

SF-36 domain Role limitation due to EMOTIONAL PROBLEM

	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre – Score	Post - Score	Pre - Score	Post – Score
N	32	32	31	31
Mean	70.8328	100.0000	67.7423	92.4729
SD	40.3841	0.0000	43.4477	23.8980
p value	P = 0.0003		P = 0.0009	

Table 9: Intragroup comparison of SF-36 domain Energy scores using paired t – test.

SF-36 domain ENERGY				
	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre – Score	Post - Score	Pre - Score	Post – Score
N	32	32	31	31
Mean	43.5937	63.7500	44.5161	49.1935
SD	10.4907	4.5791	8.7897	4.6720
p value	P < 0.0001		P = 0.0172	

Table 10: Intragroup comparison of SF-36 domain Emotional Wellbeing Scores using paired t – test.

SF-36 domain EMOTIONAL WELLBEING				
	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre - Score	Post - Score	Pre - Score	Post – Score
N	32	32	31	31
Mean	49.6250	69.8750	49.6968	54.3226
SD	10.9831	6.0947	6.5664	3.6913
p value	P < 0.0001		P = 0.0004	

Table 11: Intragroup comparison of SF-36 domain Social Function Scores using paired t – test.

SF-36 domain SOCIAL FUNCTION				
	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre - Score	Post - Score	Pre - Score	Post – Score
N	32	32	31	31
Mean	57.0312	78.1250	54.4355	63.3065
SD	12.6752	10.5303	10.9679	9.0918
p value	P < 0.0001		P = 0.0005	

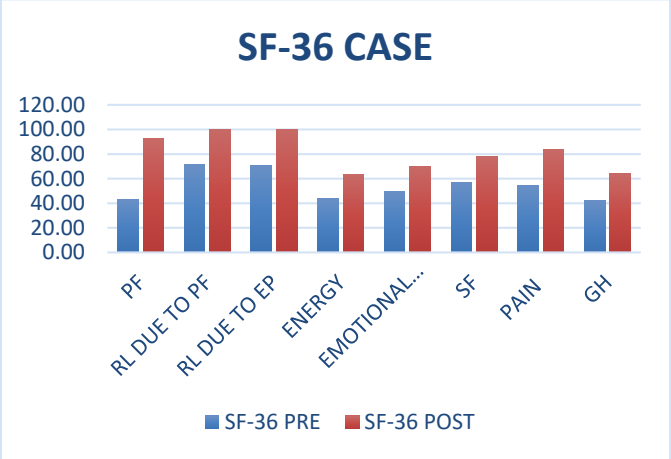
Table 12: Intragroup comparison of SF-36 domain Pain Scores using paired t – test.

SF-36 domain PAIN				
	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre - Score	Post - Score	Pre - Score	Post – Score
N	32	32	31	31
Mean	54.6094	83.7500	50.7258	69.1129
SD	11.7965	8.3280	9.4471	6.5685
p value	P < 0.0001		P < 0.0001	

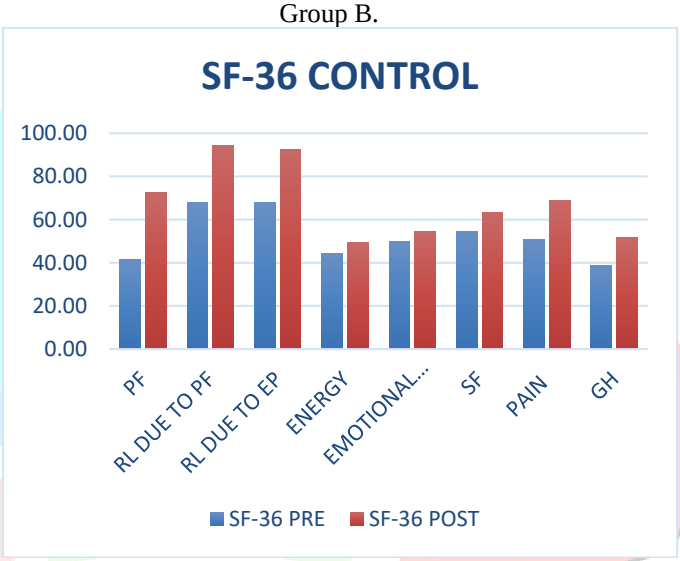
Table 13: Intragroup comparison of SF-36 domain General Health using paired t – test.

SF-36 domain GENERAL HEALTH				
	Group A (Yoga Therapy)		Group B (Conventional exercise)	
	Pre - Score	Post - Score	Pre - Score	Post – Score
N	32	32	31	31
Mean	42.0312	63.9062	38.7097	51.6129
SD	13.0049	7.5918	11.3994	6.8784
p value	P < 0.0001		P < 0.0001	

Graph 6: Intragroup comparison of SF-36 Scores pre and post intervention in Group A.



Graph 7: Intragroup comparison of SF-36 Scores pre and post intervention in Group B.



The intra-group comparison of NPRS Scores and KOOS-PF Scores were done using paired t-test and the p-value was found to be highly significant. For SF-36, all the domains showed highly significant p-value, except for Role limitation due to Physical function and Emotional problem, which was found to be significant.

INTER GROUP COMPARISON

Independent t-test was applied for the comparison.

Table 14: Intergroup comparison of NPRS Scores.

NPRS	GROUP A	GROUP B
N	32	31
Arithmetic mean	3.5062	1.5516
Standard deviation	0.7725	0.4689
p value	P< 0.0001	

Graph 8: Intergroup comparison of NPRS Score by Box and Whisker Plot Diagram.

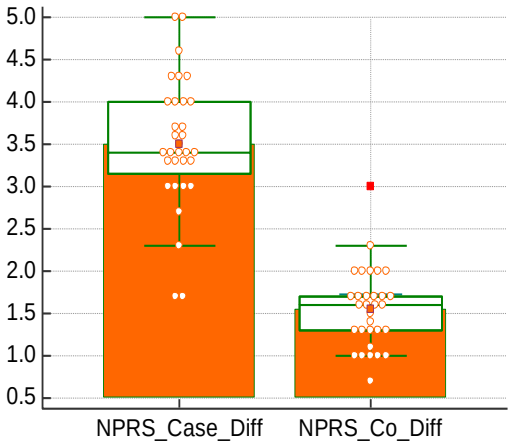


Table 15: Intergroup comparison of KOOS-PF Scores.

KOOS-PF	GROUP A	GROUP B
N	32	31
Arithmetic mean	41.0506	21.4800
Standard deviation	6.0798	5.8336
p value	P< 0.0001	

Graph 9: Intergroup comparison of KOOS-PF Score by Box and Whisker Plot Diagram.

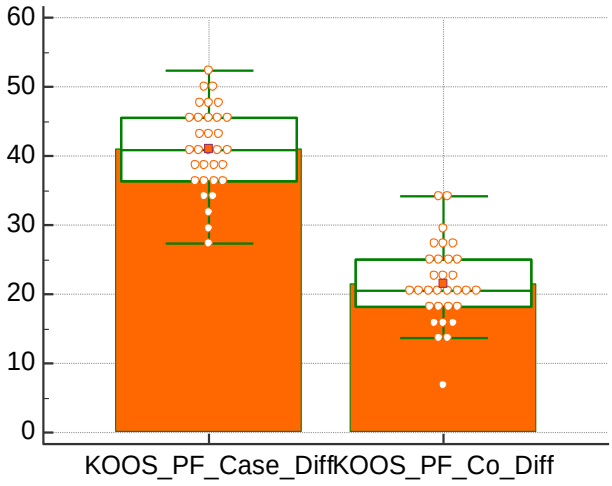


Table 16: Intergroup comparison of SF-36 domain Physical Function Scores.

PHYSICAL FUNCTION	GROUP A	GROUP B
N	32	31
Arithmetic mean	49.6875	30.9677
Standard deviation	9.6668	5.8337
p value	P< 0.0001	

Table 17: Intergroup comparison of SF-36 domain Role limitation due to Physical Function Scores.

ROLE LIMITATION DUE TO PHYSICAL FUNCTION	GROUP A	GROUP B
N	32	31
Arithmetic mean	28.9063	26.5968
Standard deviation	39.7113	38.6744
p value	0.8160	

Table 18: Intergroup comparison of SF-36 domain Role limitation due to Emotional Problem Scores.

ROLE LIMITATION DUE TO EMOTIONAL PROBLEM	GROUP A	GROUP B
N	32	31
Arithmetic mean	29.1667	24.7312
Standard deviation	40.3835	37.4836
p value	0.6532	

Table 19: Intergroup comparison of SF-36 domain Energy Scores.

ENERGY	GROUP A	GROUP B
N	32	31
Arithmetic mean	20.1563	4.6774
Standard deviation	11.6040	10.3227
p value	P < 0.0001	

Table 20: Intergroup comparison of SF-36 domain Emotional Wellbeing Scores.

EMOTIONAL WELLBEING	GROUP A	GROUP B
N	32	31
Arithmetic mean	20.2500	4.6258
Standard deviation	9.9515	6.5059
p value	P < 0.0001	

Table 21: Intergroup comparison of SF-36 domain Social Function Scores.

SOCIAL FUNCTION	GROUP A	GROUP B
N	32	31
Arithmetic mean	21.0938	8.8710
Standard deviation	15.6954	12.5804
p value	0.0012	

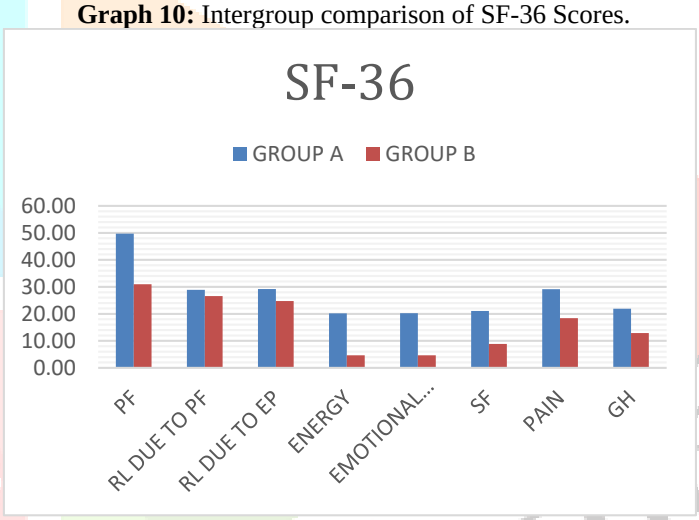
Table 22: Intergroup comparison of SF-36 domain Pain Scores.

PAIN	GROUP A	GROUP B
N	32	31
Arithmetic mean	29.1406	18.3871
Standard deviation	14.5581	9.9488
p value	0.0011	

Table 23: Intergroup comparison of SF-36 domain General Health Scores.

GENERAL HEALTH	GROUP A	GROUP B
N	32	31
Arithmetic mean	21.8750	12.9032
Standard deviation	13.6044	12.3676
p value	0.0081	

Graph 10: Intergroup comparison of SF-36 Scores.



In the Inter-group comparison, NPRS and KOOS-PF scores showed highly significant p-values, whereas for SF-36, domain Physical Function, Energy and Emotional Problem showed highly significant difference whereas Social Function, Pain and General Health showed significant difference and Role limitation due to Physical Function and Emotional Problems showed no significant difference.

DISCUSSION

The purpose of this research was to study the effect of 4 weeks yoga therapy program to improve function and level of pain in patellofemoral pain patients. The study consisted of two groups. Patients in Group A were given Yoga Therapy and patients in Group B were given Conventional Physiotherapy. Outcome measures were NPRS for pain, KOOS-PF for function and SF-36 for quality of life. The post intervention values of both the groups were compared and Group A showed highly significant difference in pain and function.

It is seen that the yogic practices would enhance muscle strength and body flexibility thereby, targeting the physical demands on ankle, knee, and hip in frontal and sagittal planes varied significantly across the different poses. [36] This in turn suggests that yogic exercises can tune up the stretch reflex mechanism and imparts proper training to the muscle spindle, nerves (alpha, beta and gamma) and nerve-endings, viz., annulospiral and flower-spray endings. This helps to improve tone of the muscles around joints and, therefore, improved flexibility. [37] And hence in the present study, Yoga therapy showed the improvements in pain and function.

When soft tissue is stretched, elastic, viscoelastic, or plastic changes occurs. Plasticity is the tendency of soft tissue to assume a new and greater length after the stretch force has been removed. Both contractile and non contractile tissues have elastic and plastic qualities. There are a number of changes that occur time in anatomical structure and physiological function of the contractile units (sarcomeres) in muscle if a muscle is stretched during an exercise. To minimize activation of stretch reflex and subsequent increase in muscle tension and reflexive resistance to muscle lengthening during stretching procedures, a slowly applied, low intensity, prolonged stretch is considered preferable. [38]

The increase in muscle flexibility and strength will decrease the level of pain and improve the function. Thus, we got highly difference in the values of NPRS and KOOS-PF values in Group A.

In this present study, Utkatasana generally strengthens the Quadriceps, Hasmstrings, Gluteus Maximus, Gastrocnemius, Tibialis Anterior, Soleus and other muscles in lower extremities. [39]Utthithasana mainly strengthens Vastus medialis part of quadrices and the whole lower limb musculature. [nilima mam]. Three common poses (Crescent, Warrior II and One-legged Balance) target three functionally important motor groups simultaneously – namely, hip flexors and extensors, knee flexors and extensors and ankle plantar flexors. [36]

Thus, **understanding the biomechanical profiles of yoga poses is a first step to designing evidence-based programs that can target specific joints and muscle groups to prevent or address impairments in function and mobility.** [36]

Quality of life is getting more attention to social life and Yoga has been proved to have positive effect on the same. Laidi Kan in his systematic review The effects of Yoga on Pain, Mobility and Quality of Life in patients with Knee Osteoarthritis showed that Yoga not only has positive effects on pain and mobility but also has positive effects on Quality of life as along with the physical component it also focuses on mental health and reduces depression, anxiety and stress. [40]

This study also proved that Yoga Therapy had highly significant effects on quality of life SF-36 components Physical Function, Energy and Emotional Problem whereas significant effects on Social Function, Pain and General Health.

CONCLUSION

Results of the present study indicate that an integrated Yoga Therapy program is effective to reduce level of pain and improve function in patients with Patellofemoral pain syndromes compared to that of conventional physiotherapy exercises.

So, Yoga Therapy can be used as an adjunct to conventional physiotherapy exercises in management of Patellofemoral pain syndromes.

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