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RESEARCH ARTICLE

To see the effectiveness of kinesio taping and patellar correction in patello femoral pain syndrome

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ABSTRACT

Background and Purpose: Patellofemoral syndrome (PFS) is characterized by a group of symptoms resulting from physical and biochemical changes in the Patellofemoral joint. The common presentation is knee pain in association with positions of the knee that result in increased or misdirected mechanical forces between the kneecap and femur. The purpose of this study is to see the effectiveness of kinesio taping and patellar correction in Patellofemoral pain syndrome. This will help in identifying the better treatment approach for Patellofemoral pain syndrome.

Methods

Sample of 40 subjects were taken in this study. Patient were included this study with unilateral Patellofemoral pain for at least 2 month, age 19-38 years Female

Design of study: Pretest and post test control experimental design

Data analysis: Data was analyzed by using the software SPSS version 15.0. Statistical analyses VAS score; AKPS and Q angle was used. For within the group analysis paired simple t test was applied with variation of F (f =12.43) and for between the group analysis was conducted using independent t test with level of significance ,α set at 0.05.

Result: Significant difference was found within and between the groups for each outcome measure at each follow up period.

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INTRODUCTION

Patellofemoral pain syndrome (PFPS) is one of the most common knee complaints, especially among females. [1,2] The incidence in the general population is 25% in adolescents and adults.[3] Patellofemoral pain is caused by numerous pathophysiological processes.[4] A tightness of the soft tissue around the knee joint and a quadriceps muscle imbalance have frequently been described as the contributing factors in Patellofemoral pain. The abnormal relationship in the activation pattern of the vastus medialis Oblique (VMO) and vastus lateralis (VL) can alter the dynamics of the Patellofemoral joint (PFJ).[5,6] This imbalance may lead to lateral tracking of the patella by the action of VL during knee extension.[7]

The patella's ability to track straight in the trochlear groove is determined by the quadriceps' angle of pull. When the Q angle is greater, the quadriceps pull the patella in a more lateral direction. The unequal pull on the patella causes increased tensile stress on soft tissues around the knee. Too much lateral pull on the patella also can drag it against the lateral femoral condyle and eventually cause degeneration of the cartilage on the underside of the patella. Problems associated with the patella and its correct movement during flexion and extension are referred to as patellar tracking disorders. In addition to patellar tracking disorders, a larger Q angle also can be a major factor in patellar subluxation or dislocation, as well as anterior cruciate ligament sprains.

Previous researches using the KT have been conducted on healthy subjects; the results from these studies may not be

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applicable to individuals with pathology. No previous studies on PFPS patients have investigated the effectiveness over an extended period of kinesio taping on pain, soft tissue flexibility and functional performance in these patients, while some recent studies have investigated the immediate effects of KT in PFPS. Some studies show that taping the patella using a medial glides showed that taping the patella using a medial glide, neutral glide, or lateral glide technique produced a significant average reduction in reported pain in patients with PFPS. The effect measured was an immediate one and not over an extended time period. Both neutral glide and lateral glide techniques produced significantly greater average degrees of analgesia than the medial glide taping technique. This strongly supports reports in previous studies that the success of patellar taping is not based upon realignment of the patella. The use of taping for patients with PFPS for the purposes of pain relief is supported, but the widely taught technical application of tape for the express purpose of mechanically realigning the patella should be questioned.

This study aim to evaluate additional patellar correction technique with kinesio taping will be effective to long term effect on Patello femoral pain syndrome.

METHODOLOGY

Sample Size

Samples of 40 subjects were taken in this study on the basis of inclusion and exclusion criteria. The subjects were randomly assigned to two groups with 20 subjects in each group.

Source of the Subjects

Females' subjects with knee pain had taken from the IIMSR, Neera Hospital, Ortho clinic Lucknow India.

Method of Selection and Assignment

All the subjects were selected based on the inclusion and exclusion criteria, subjects were screened for patello femoral pain syndrome and were randomly assigned into two groups with 20 subjects each group. Prior to participation each subject were required to read and sign an informed consent form.

The subjects were randomly assigned to two groups.

Group A: Experimental group (kinesio taping +patellar correction+ conventional physiotherapy)
Group B: Control group (conventional physiotherapy)

Inclusion criteria

1.Age30-50years, 2.Female, 3.Patellofemoral pain unilateral involvement,4.Willingness to participate.

Exclusion criteria

1.Ligamentous pathology, 2.Patellar Tendinitis,3.Meniscus injury,4.Patellar dislocation or subluxation,5.Previous Knee Surgery.

Design of the study

Pretest post test experimental control group design

Instrumentation

1. Visual analogue scale(VAS)
2. Goniometer
3. Anterior knee pain scale(AKPS)

Protocol

Prior to participation each subject were required to read and sign an informed consent form. all the subjects who meet the inclusion and exclusion criteria were assigned into two groups. Measurements were taken for VAS, AKPS and Q angle. The baseline measurement was taken prior to the treatment (pre – intervention),second reading was just taken after treatment post –intervention, third reading was taken seventh day post-intervention, fourth reading was taken fourteenth day post-intervention, fifth reading was taken twenty day post – intervention, sixth reading was taken fourth weeks from day first with intervention.

Procedures

Measurement of Visual Analogue Scale Score

The pre intervention data score on the VAS was taken from the subjects between o to 10.0 explains no pain, 5 explains mild to moderate pain and 10 represents severe pain. Subjects were asked to mark on VAS the level of pain post intervention.

Measurement of functional Disability

The measurement of functional disability was taken by the anterior knee pain scale or kujala scale. The anterior knee pain scale or kujala scale was given to the subjects and they instructed to the take the choice closest activity or more than one activity which indicates the true subjective assessment of the subject disability for the particular items. The scores include nine activities and final score is calculated by adding all the activities. The activities which are included in this functional disability are: 1.Resting, 2. Sitting, 3.Standing on Knee, 4.Walking, 5.Squatting, 6.Ascending Stairs, 7.Descending Stairs, 8. Going up hill, 9. Going downhill.

Measurement of Q angle

It is an index of the vector for the combined pull of the extensor mechanisms and the patellar tendon [19, 35, 59]. It is measured by drawing a line from the anterosuperior iliac spine to the centre of the patella, and a second line from the centre of the tibial tubercle to the centre of the patella.

The angle where these lines intersect is regarded as the Q-angle [22, 59]. Traditionally, the Q-angle has been measured with subjects in supine, knee extended and with the quadriceps muscle relaxed [32]. This is regarded as the 'traditional' or

'conventional' method of assessing Q-angle. The Q-angle has also been assessed on standing [10, 27].

Intervention

Group A: kinesio taping and patellar correction and conventional physiotherapy

Participants belonging to group A, which was an experimental group, were given conventional physiotherapy followed by kinesio taping and patellar correction. Conventional physiotherapy including stretching of hamstring, calf muscles, it band and quadriceps muscles fibers mainly vastus medialis oblique and vastus lateralis.

Both kinesio tape strips were measured from the medial condoyle of the femur diagonally over the patella up to the lateral outer margin of the patella with the knee extended. With the knee in the neutral position, the base is affixed medially and proximally to the vastus medialis, and then the two tail tapes were placed on the skin in the direction the correction is to be made.

With maximum skin displacement, the base is anchored with the hand, and the patient moves the knee slowly from the neutral into the flexed position. During this movement, the upper tape tail is affixed with maximum tension over the patella up to its lateral margin. The tape end is affixed without tension in the maximum knee flexion position

The knee is brought into the neutral position again and the second tape tail is affixed over the patella, slightly offset, in the same way as the first. The knee is in the neutral position and the base affixed medially and distally in the region of the pes anserinus. The upper tape tail is affixed over the patella up to its lateral margin with maximum tension while the knee is being brought into the flexed position, as described for the previous tape strips. The lower tape tail is affixed without tension in the maximum knee flexion position.

The conventional physiotherapy including stretching exercises of hamstring, quadriceps, ITB and isometric and isotonic exercises and isotonic exercises for quadriceps, hip adductors, gluteus medius and maximus, open chain exercises like straight leg raise and leg raise with internal and external rotation and closed chain exercises include mini squat.

Data analysis

Data analysis was performed with SPSS version 20.0. The mean differences with SD for outcome measures of pain were calculated on VAS (visual analog scale) and for functional activity AKPS (anterior knee pain scale) is used , and Q angle for ROM (range of motion) for time periods of pre treatment, 1st day, 14th day , 21st day, week and 28th day. ANOVA was used to determine if significant differences ($p<0.05$) existed within and between groups for each outcome measure at each follow up period.

RESULT

Demographic Data

Forty female subjects in the age group of 30 to 50 years were evaluated at day I for the study with mean and standard deviation of group A for age was 43.14 ± 10.832, for group A for age was 45.40 ± 4.285, for BMI of group A was 27.94 ± 6.877 , group A was 25.93 ± 2.665. (Table 1)

Table NO. 1 Showing Mean and SD of age and BMI

Variables	GROUP A	GROUP B
AGE	43.14 ± 10.832	45.40 ± 4.285
BMI	27.94 ± 6.877	25.93 ± 2.665

The pain intensity (VAS) was measured on day 0, Day 1. Day 7, day 14, (pre test data as VAS 0, post data as VAS 1,after one 7 days (represents VAS 7), at 14 day of treatment (represents VAS 14),at 21st day of treatment (represents VAS 21),at the end of the treatment at 28 day (represents VAS 28). for within group analysis paired sample t test was applied with variation of F (f =12.43). between the group analysis was conducted using independent t test with level of significance,α set at 0.05. 1 comparison of pain intensity (VAS) within groups. The details of analysis are given in table 2 and table 3. The anterior knee pain scale (AKPS) was measured on day 0 pre test data as AKPS 0), at the end of treatment session i.e. after 7 days (represented as(AKPS 7), and post treatment on day 21 as (AKPS 21), and at the end of treatment day 28 as(AKPS 28). for within the group analysis paried sample test was applied with 95% confidence interval and the level of significance ,α set at 0.05 .the details of analysis are given in table .between the groups analysis was conducted using the independent t test with the level of significance, α set at 0.005. The details of analysis are given in table 4 and table 5

Table NO.2 Comparison of VAS between Groups Showing Mean and SD

	GROUP A	**GROUP B**	**Statistical significance**	
VAS	**(mean ± SD)**	**(mean ± SD)**	F value	p value
VAS 0	7.35 ± O.988	6.40 ± 0.681	1.925	0.001
VAS 1	7.05 ± 0.826	6.20 ± 0.768	0.003	0.001
VAS 7	6.20 ± 0.894	5.60 ± 0.681	1.079	0.002
VAS 14	5.40 ± 0.883	5.05 ± 0.882	0.334	0.000
VAS21	2.95 ± 0.826	4.45 ± 1.050	3.454	0.000
VAS28	1.75 ± 0.550	4.35 ± 1.040S	8.170	0.000

The Q angle(Q°) was measured on day 0 pre test data as Q° 0),at the end of treatment session i.e. after 7 days (represented as(Q° 7),and post treatment on day 21 as (Q°21),and at the end of treatment day 28 as(Q° 28).for within the group analysis repeated ANOVA was applied with 95% confidence interval and the level of significance, α set at 0.05 .the details of analysis are given in table. between the groups analysis was conducted using the independent t test with the level of significance, α set at 0.05. The details of analysis are given in table 6 and table 7

Table No.3 Comparison of VAS Within the Group Showing 'p' value

Group	VAS0 vs VAS1	VAS0 vs VAS7	VAS0 vs VAS14	VAS0 vs VAS21	VAS0 vs VAS28	VAS1 vs VAS7	VAS1 vs VAS14	VAS1 vs VAS21	VAS1 vs VAS28	VAS7 vs VAS14	VAS7 vs VAS21	VAS7 vs VAS28	VAS14 vs VAS21	VAS14 vs VAS28
A	0	0.003	0	0	0	0	0	0.003	0.005	0	0	0.001	0.001	0
B	0.003	0	0.002	0.013	0.003	0.004	0.001	0	0	0.024	0	0.023	0	0.003

Table No.4 Comparison of VAS between Groups Showing Mean and SD

AKPS	GROUP A(N=20) (mean ± SD)	GROUP B (N=20) (mean ± SD)	Statistical significance (F value)	(p value)
AKPS 0	6.50 ± 1.469	6.60 ± 0.754	11.74	0.002
AKPS 1	6.50 ± 1.469	6.60 ± 0.754	11.164	0.000
AKPS 7	5.65 ± 1.461	6.51± 0.671	14.954	0.002
AKPS 14	5.00 ± 1.451	5.65 ± 0.671	2.496	0.000
AKPS 21	4.00 ± 1.257	5.10 ± 0.968	1.097	0.000
AKPS 28	3.40 ± 1.429	4.85 ± 0.933	5.540	0.000

with kinesio taping there was a significant improvement between baseline and final readings in all three variables. In the study by Whittingham *et al*[26,30] subjects diagnosed with PFPS (24 men, 6 women) were randomly allocated to a patellar taping and exercise group, a placebo taping and exercise group, or an exercise group (no taping). The subjects performed the daily exercise program, consisting of lower extremity muscle stretching (hamstrings, quadriceps, gastronomies, and illiotibial band), non–weight-bearing knee flexion extension and straight-

Table NO.5 Comparison of AKPS within the Group Showing 'p' value

Group	AKPS0 vs AKPS1	AKPS0 vs AKPS7	AKPS0 vs AKPS14	AKPS0 vs AKPS21	AKPS0 vs AKPS28	AKPS1 vs AKPS7	AKPS1 vs AKPS14	AKPS1 vs AKPS21	AKPS1 vs AKPS28	AKPS7 vs AKPS14	AKPS7 vs AKPS21	AKPS7 vs AKPS28	AKPS14 vs AKPS21	AKPS14 vs AKPS28
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0	0.004	0.066	0.225	0.001	0.004	0.225	0	0	0.003	0.006	0	0	0

Table NO.6 Comparison of Q angle between Groups Showing Mean and SD

Q ANGLE	GROUP A(N=20) (mean ± SD)	GROUP B (N=20) (mean ± SD)	Statistical significance F value	p value
Q ANGLE 0	21.30 ± 1.129	21.65 ± 0.875	1.512	0.001
Q ANGLE 1	21.30 ± 1.129	21.65 ± 0.875	1.512	0.001
Q ANGLE 7	20.60 ± 1.095	21.30 ± 0.979	0.392	0.001
Q ANGLE 14	20.30 ± 1.129	20.85 ± 0.933	1.522	0.028
Q ANGLE 21	19.60 ± 1.188	20.70 ± 1.129	0.131	0.004
Q ANGLE 28	19.35 ± 1.137	20.70 ± 1.129	0.013	0.004

leg raises, and weight-bearing knee and hip strengthening exercises, after tape application (no tape for the exercise-only group). The subjects' VASs for average pain over the 24 hours before the study and pain after a step-down with and without the tape (for the patellar taping and placebo taping groups) were measured and the Functional Index Questionnaire was administered on 5 occasions: at the beginning of the study and at 4 weekly assessments.

Table NO.7 Comparison of Q Angle within the Group Showing 'p' value

Group	Q°0 vs Q°1	Q°0 vs Q° 7	Q°0 vs Q°14	Q°0 vs Q°21	Q°0 vs Q° 28	Q°1 vs Q°7	Q°1 vs Q°14	Q°1 vs Q°21	Q°1 vs Q°28	Q°7 vs Q°14	Q°7 vs Q°21	Q°7 vs Q°28	Q°14 vs Q°21	Q°14 vs Q°28
A	0	0	0.04	0	0	0.03	0.01	0	0	0	0	0	0	0
B	0	0.01	0	0	0.03	0.01	0.14	0	0	0	0.01	0	0.02	0

DISCUSSION

This study was designed to see the effectiveness of kinesio taping and patellar correction in patello femoral pain syndrome in this we examined the effect of experimental group i.e. kinesio taping and patellar correction with respect to control group .the mean improvement in the pain intensity and anterior knee pain scale and Q angle was found to be greater in experimental group A in comparison to control group B.

The result of the present study indicate that kinesio taping and patellar correction is more effective than conventional physiotherapy in patello femoral pain syndrome there by supporting the experimental hypothesis.

Group A: kinesio taping and patellar correction

Comparison of the subjects within group who received kinesio taping and patellar correction showed statically significant improvement in all these related variables i.e. VAS, AKPS, Q angle over course of the study.

In Herrington's preliminary study,[27] the efficacy of patellar taping on quadriceps peak torque and perceived pain in 14 female subjects with PFPS was investigated through repetitive maximum is kinetic quadriceps contractions. These exercises were performed at different velocities (608/s and 1808/s), and under different taping conditions (tape and no tape) by each subject. Patellar taping significantly decreased perceived pain on VAS (608/s: untapped 5 5.9 6 1.8, taped 5 1.8 6 1.8; 269.5%, *P*, .001; 1808/s: untapped 5 3.9 6 1.7, taped 5 0.9 6 0.9; 276.9%, *P*, .001) during is kinetic quadriceps contractions. Herrington suggested that patellar taping may create a change in afferent fiber input, which may increase the alpha motor neuron excitability via the spinal cord. This study generated a 3/10 on the PEDro scale. Points were not awarded for random allocation of subjects; concealed allocation; information about baseline characteristics; blinding of the subjects, therapists, and assessors; and between-group comparisons.

NG and Cheng[4] examined the effects of patellar taping on pain and the EMG activity ratio of VMO to vastus lateralis (VL) during exercise in 15 subjects diagnosed with PFPS. Subjects performed single-leg squat exercises with and without tape.

Subjects demonstrated a significant decrease in pain on VAS (untapped 5 2.3 6 2.02, taped 5 1.2 6 1.66, *P*, .001) with patellar taping. (The effects of patellar taping on VMO and VL EMG activity will be discussed in the following section.) The PEDro scale rating was 4/10 for not concealing the allocation; not blinding the subjects, therapists, and assessors; no information about the subjects' baseline characteristics; and no between-group statistical comparisons.

Cowan *et al*[2] investigated the influence of patellar taping on the onset of VMO activity relative to VL on PFPS and healthy subjects. The level of pain was significantly decreased under the patellar-taping condition in the PFPS group after the stair ambulation task (F18,2 5 30.95, *P* , .0001). Findings regarding the onset of VMO activity relative to VL and the PEDro scale rating will be discussed later.

Gigante *et al*[20] assessed the effect of patellar taping on patellofemoral incongruence. Computed tomography images of the knees of 16 female subjects with PFPS were captured before and after patellar taping. No statistically significant differences were demonstrated in patellar lateralization or patellar tilt between the taped and untapped conditions. The authors suggested that the patellar taping did not correct patellofemoral incongruence in the subjects with PFPS and that pain reduction from patellar taping may be achieved by other mechanisms, such as increased cutaneous stimulation and the altered order of motor unit recruitment. However, they did not investigate other outcome measures, such as pain reduction and functional improvement, associated with patellar taping. This study was assigned a score of 3/10 on the PED ro scale. No points were awarded for randomized or concealed allocation of the subjects; providing the baseline characteristics of the subjects; blinding the subjects, therapists, and assessors; or reporting between-group comparisons.

Cowan *et al*[2] investigated the influence of patellar taping on the onset of VMO activity relative to VL on PFPS and healthy subjects. The level of pain was significantly decreased under the patellar-taping condition in the PFPS group after the stair ambulation task (F18,2 5 30.95, *P* , .0001). Findings regarding the onset of VMO activity relative to VL and the PED ro scale rating will be discussed later.

Christou[3] examined the effect of patellar taping on force production, EMG activity of the VMO and VL, and perceived pain in 30 female subjects, 15 of whom were diagnosed with PFPS. Subjects performed maximal isokinetic leg presses under no-tape (control), no-glide (placebo), and medial- and lateral-glide (experimental) conditions. The medial-glide and placebo-tape conditions significantly decreased pain in the group with PFPS (*P*, .001). Information regarding force production and EMG activity of VMO and VL will be discussed in the ''Neuromuscular Control'' section. Christou's study yielded a score of 5/10 on the Pedro scale. Points were withheld for no concealment of allocation; no baseline comparability; and no blinding of the subjects, therapists, and assessors.

Salsich *et al*[1] demonstrated a 92.6% reduction in pain measured on the VAS after tape application in 10 subjects with PFPS during stair ambulation (5.4 6 2.2 pre tape versus 0.4 6 0.5 post tape). This study will be discussed in more detail in the ''Neuromuscular Control'' section, because the authors also examined knee biomechanics and EMG during stair ambulation with and without patellar taping.

Powers *et al*[24] investigated the effects of patellar taping on stride characteristics and reported an immediate average pain reduction of 78% on the VAS for pain after the tape application (un taped 5 7.7 6 1.4, taped 5 1.7 6 1.1), although pain was not a variable included in the statistical analysis of the study. Findings on stride characteristics will be discussed in the ''Neuromuscular Control'' section.

Bockrath *et al*[15] assessed the effects of patellar taping on patellar position and perceived pain. Twelve subjects with PFPS currently using patellar taping as a means of pain control underwent radiographic examination with the Merchant view before and after patellar taping while contracting their quadriceps isometrically. Subjects also completed a VAS pain rating after performing a step-down task before and after taping. Although the position of the patella did not change significantly, patellar taping reduced the subjects' perceived pain after a step-down (un taped 5 4.38 6 3.73, taped 5 2.02 6 2.86; *t*15 5 4.99, *P*, .0005). The Pedro score for this study was 3/10 because of no randomization or concealment of allocation; no baseline comparability; no blinding of the subjects, therapists, and assessors; and no between-group comparisons.

Neuromuscular Control Theory- In this section, we will discuss the effects of patellar taping on different aspects of neuromuscular control, such as quadriceps activity, the onset of VMO activity relative to the VL, and biomechanics of the knee during activities.

Quadriceps Activity. The results of the previously mentioned study by Clark *et al*[18] indicated that quadriceps power was significantly improved in all subjects with PFPS (*P*, .001) after 3 months of treatment. However, the observed improvement was more prominent in the exercise and education groups than in the group with tape alone.

Kowall *et al*, [25] as described above, found that isokinetic quadriceps strength and quadriceps EMG activity showed improvement after the physical therapy (*P*, .05 for quadriceps strength, and *P*, .001 for EMG activity), but there were no differences between the tape and no-tape groups.20 They concluded that adding patellar taping to a physical therapy program did not affect improvement in pain, quadriceps strength, or EMG activity.

In Herrington's study described earlier,27 the efficacy of patellar taping on quadriceps peak torque and perceived pain in 14 female subjects with PFPS was investigated. In addition to pain reduction, patellar taping significantly increased quadriceps peak torque (concentric 608/s: 20.5%, *P*, .001; eccentric 608/s: 25.9%, *P*, .001; concentric 1808/s: 20.5%, *P*, .001; eccentric 180 8/sec: 18.8%, *P*, .001) during isokinetic quadriceps contractions. Herrington suggested that repositioning the patella with corrective patellar taping may alter the leverage of the patella, maximizing the mechanical advantage of the quadriceps.27 However, when the patella is

repositioned in the center of the trocShlear groove of the femur, it is possible that the moment arm of the quadriceps is actually decreased, because the patellar tendon may be oriented closer to the knee joint center. Although pain was reduced immediately after the patella was taped, it is questionable whether efferent pathways were immediately restored, allowing the quadriceps to demonstrate improved torque immediately.

Lower extremity weight-bearing exercise has been reported to be more effective than has non-weight bearing (isolated-joint) exercise in restoring function in patients with Patellofemoral pain syndrome

Increased muscle flexibility)' following stretching has been attributed to a number of theorized hansoms. Tanigawa[60] proposed that improvements made by patients using passive stretching may be the result of both autogenic inhibition and tensile stress applied to the muscle. Muscles' viscoelastic characteristics are enrich that when stress is applied over a constant period of time, the muscle will gradually relax and increase in length. The restilt is nsnally greater ROM in the joint the muscle cros.ses. With atrtogenic inhibition, the muscle being stretched is inhibited and is thought to simultaneously relax, restyling in an increase in ROM. Studies 'indicate, however, that muscle relaxation is primarily due to tensile stress rather than to atitogenic inhibition, which is responsible for any improvement with passive stretching.

The findings are consistent with previous investigators who have reported that exercise can reduce pain and increase the functional abilities in patella femoral pain patients. The Fitness and Seniors Trial[15] reported a modest 8% to 10% improvement in pain and functioning scores as a result of 18 months of or resistance exercise among their sample of patella femoral pain patients.

Further Deyle *et al*[16]. Falconer *et al*[97] and Fisher *et al*[98] found same positive effects of exercise programme on pain and function. It is well documented in literature that the impaired quadriceps strength found to be the greatest single predictor of lower limb functional limitation

Further study done by Boon Whatt LIM *et al*[118] concluded that quadriceps strengthening has beneficial effect on pain and function in patients with patello femoral pain. The study done by Shreyasee Amin *et al* concluded that greatest quadriceps strength had less patella femoral pain and better physical function than those with the least strength. Strong muscles stabilize joints in the proper alignment, absorb shocks that are transmitted to the joints, and reduce the effect of impact by spreading the forces out over a greater area.

Grabiner, Koh and Miller[65] studied fatigability in subjects doing isometric or short arc quad exercises from 30 degrees to full extension and found no difference between the VMO and VL in either paradigm, suggesting that these do not selectively work either component18. Hanten and Schulthies[65] in a study of twenty five subjects found that hip adduction exercises activated VMO more than VL.

Active stretching may improve the function of the antagonist muscles, although we have no data to support that assertion. We did not measure isometric muscle torque or endurance in our study. In future studies, researchers should investigate the changes in antagonist muscle function associated with active stretching, whether an active stretching regimen results in fewer subsequent injuries, and whether muscle length is maintained after the stretching program is stopped

Relevance for clinical practice

Many studies have verified the prevalence of patellofemoral pain as the most common clinical condition presented to clinicians who treat musculoskeletal conditions. The exact cause of this syndrome is not clear, and varies from patient to patient. The present study was an investigation into one of the many methods used to treat patellofemoral pain.

Strength training in semi squat with hip adduction position may be useful in decreasing the time for rehabilitation and maximizing the recovery potential of patients of patella femoral pain with increase quadriceps muscle strength. It may permit earlier initiation of vigorous strength training if there are precautions to dynamic strengthening techniques.

Limitation of study

The duration of study is not adequate to study the long term effect of kinesio taping with patellar correction in patello femoral pain. Inclusion of specific age group could have given the more reliable information of the correction than large group. The sample size is not adequate to provide statistical improvement in result

Future research

Future study may use combination of EMG-biofeedback with dynamic exercise, so that more of functional status could be evaluated. Study include diagnostic EMG with EMG biofeedback can give rise to better measurement of muscle strength. In the present study we chose VMO and Rectus femoris muscles for strengthing, as these muscles provide major contribution to quadriceps strength. In addition VMO is the main muscle for patellar stabilization. So, further study can be done on the other muscle groups such as hamstring. In present study we included patient with osteoarthritis of knee. So, further study may include other orthopedic conditions. Study may be done for longer duration with adequate follow-up to establish the improvement being the permanent one.

CONCLUSION

The result of the study showed that application of kinesio tape and patellar correction technique is more beneficial than conventional physiotherapy treatment in patellofemoral pain syndrome. The result of the study conclude by the accepting the experimental hypothesis that "kinesio taping and patellar correction is effective in patello femoral pain syndrome", and rejecting the null hypothesis that "kinesio taping and patellar

correction is having no effect in patello femoral pain syndrome".

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