

## Efficacy of Patellar Taping and Drop Squats Training Programme to Patellofemoral Pain Syndrome for Female Athletes

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### Abstract

PFPS is an anterior knee pain arising in the patellar subcondral bone. Alteration in patellar tracking, increased PFJ forces, or combinations of these biomechanical features is risk factors of PFPS. More recent theory suggests that pain due to "A supra physiological mechanical loading and chemical irritation of the nerve endings denoting loss of tissue homeostasis. This study finds patellar taping technique with drop squat exercises to realign the PFJ and consequently to reduce the pain level in the PFPS. This study evaluates the effectiveness of patellar taping with drop squat training program to reduce pain and improve PFJ function in patients with PFPS. A total number of 20 female athletes with PFPS was selected by purposive random sampling method after due consideration to the inclusion and exclusion criteria. The study was conducted for a period of 1 month at physiotherapy department, shanmuga hospital, Salem. Selected 20 subjects before train drop squat exercise patellar movement controlled by patellar taping application. Before treated with taping and drop squat pain and knee function measured by the use of VAS and Lysholm knee function Scale. After completion of treatment program subjects post-test values of pain and knee function level recorded. The results of this study are encouraging the use of patellar taping and drop squat training to correct biomechanical factors controlling patellar tracking.

**Keywords:** PFPS; PFJ; Subcondrol; VAS.

### Introduction

PFPS cause by imbalance in the forces controlling patellar tracking during knee flexion and extension particularly overloading of joint. PFPS typically describe pain "Behind" "underneath" or "around" the patella.[1] It is the most common cause of anterior (front) knee pain in young active adults, especially runners. [2] Risk factors for PFPS include abnormal hip and knee joint motion, an increased Q-angle, abnormal or excessive foot pronation, quadriceps and hip abductor muscle weakness and reduced hamstring flexibility. Abnormal movement in the transverse and frontal planes of the tibia (shin bone) and femur (thigh bone) have recently been shown to effect movement of the patellofemoral joint and cause pain.[3] PFPS often used interchangeably with

"Anterior Knee Pain" or "Runner's Knee". It is the most common cause of knee pain. PFPS constitutes 16 to 25 percent of all Injuries.[4,5, 6] PFPS can be defined as anterior knee pain involving the patella and retinaculum that excludes other intra articular, peripatellar pathology.[7] Patellar taping is known as an effective treatment method for improving the symptoms of PFPS.[8] It is believed that this method affects the tracking of the patella and centralizing it within the trochlear groove.[9, 10] The effect of patellar taping on sagittal plane knee moments during a leg vertical jump, lateral step-up and stair-stepping task in subjects with PFPS.[11,12] Forces on the patella range from between one third and one half of a person's body weight during walking to three times body weight during stair climbing and up to seven times body weight

during squatting.[13] Several factors may create a predisposition for the development of PFPS via alterations in patellar tracking, increased patellofemoral joint forces, or combinations of these biomechanical features. Overuse, trauma, and anatomic factors appear to be the main contributors.[14] The mechanism by which taping affects the PFJ is not completely clear; so, it has been proposed that the application of the tape alters the knee extensor moment and PFJRF of the various articulations associated with the knee joint during knee bent activities. (15)

## Methodology

Total number of 20 female athletes with PFPS was selected by purposive random sampling method after due consideration to the inclusion and exclusion criteria. The study was conducted for a period of 1 month at physiotherapy department, shanmuga institute of medical sciences hospital, Salem. A written informed consent was taken from each participant. Selected 20 subjects before train drop squat exercise patellar movement controlled by patellar taping application. Null hypothesis there is no significant improvement with patellar taping and drop squat exercise training program for PFPS. Alternate

hypothesis there is significant improvement with patellar taping and drop squat exercise training program for PFPS.

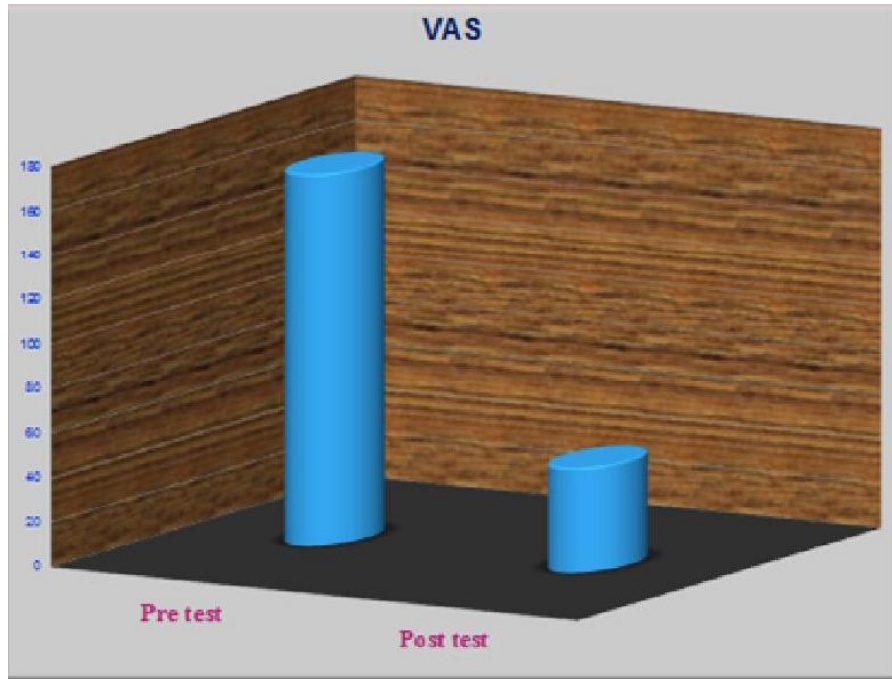
Before subjects were advised taping and drop squat, anterior knee pain and knee function measured by the use of VAS and Lysholm knee function Scale. After completion of treatment program subjects post-test values of pain and knee function levels recorded.

### Data Analysis

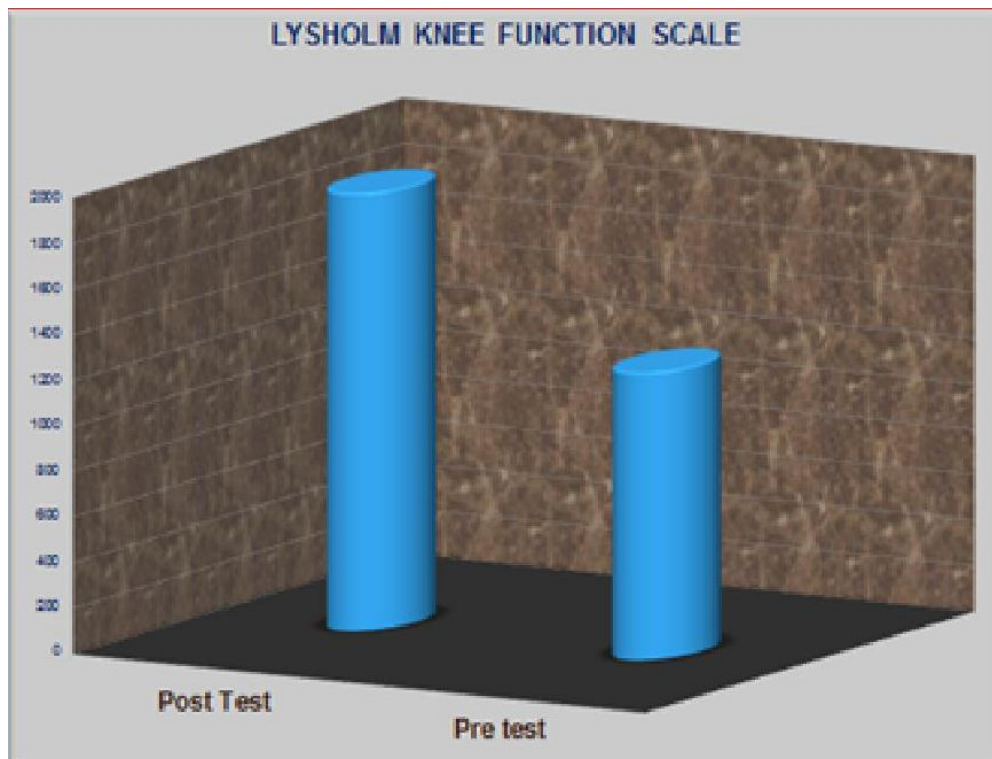
S. No.	VAS		Lysholm Scale	
	Pre Test	Post Test	Pre Test	Post Test
1	8	5	29	95
2	9	7	60	95
3	7	5	71	100
4	9	4	62	94
5	10	3	74	100
6	6	0	60	96
7	7	2	72	95
8	8	4	75	100
9	5	4	51	100
10	7	0	75	97
11	10	0	47	91
12	9	0	66	100
13	8	3	73	95
14	9	0	48	95
15	10	2	46	85
16	8	2	76	90
17	10	1	74	91
18	9	2	75	100
19	8	3	62	100
20	10	0	66	100

Inclusion criteria	Exclusion criteria
Female athletes age less than 30 years,	Any trauma,
Anterior or retro patellar pain insidious nature	Inflammatory or infectious pathology in the knee joint
Aggravate by two of the following functional activities	Dislocation or subluxation in the PFJ
<ul style="list-style-type: none"> <li>✓ Prolonged sitting ("theatre" sign),</li> <li>✓ Stair climbing,</li> <li>✓ Squatting,</li> <li>✓ Running,</li> <li>✓ kneeling,</li> <li>✓ Hopping/jumping.</li> </ul>	History of surgery in the knee joint
	Any signs of secondary OA
	Osgood-Schlatter disease
	Plica syndrome
	Osteochondritis dissecans

### Pre and Post Test Value of VAS



### Pre and Post Value of Lysholm Score



### Discussion

Patellofemoral pain syndrome (PFPS) is a  
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relatively common disorder encountered in the clinical setting, affecting an estimated 7% to 40% of adolescents and active young adults.[16,17] The major complaint of

individuals with patellofemoral pain syndrome (PFPS) is anterior knee pain or pain behind the patella (retropatellar pain) and is experienced usually during running, squatting, and stair climbing.[18,19,20] The purpose of this study was to examine the effect of various patellar taping procedures on force production. EMG activity of the VMO and Vastus lateralis (VL) muscles, and perceived pain experienced by 30 women (27.3+/- 1.53 years), half diagnosed with PFPS. The perceived pain, force and EMG of the VMO and VL, were recorded while subjects performed maximal isokinetic leg presses at 30 degrees for each of the following patellar taping conditions no tape (control), no glide(placebo), medial and lateral glide(experimental). The medial and placebo procedures significantly ( $p < 0.01$ ) reduced perceived pain (70-80%) in PFPS subjects. The findings suggest that taping the patella medially can contribute positively to PFPS rehabilitations.[21]

Taping in the management of patellofemoral pain is to correct the abnormal position of the patella in relation to the femur. Patellofemoral Joint Reaction Force (PFJRF) of eighteen subjects with PFPS and eighteen healthy subjects as controls were assessed by a motion-analysis system and one force plate. This procedure was performed on the affected knee of subjects with PFPS, before, during and finally after patellar taping during unilateral squatting. A similar procedure was also performed on the unaffected knees of both groups. The mean values of PFJRF prior to taping (2025 N, SD 347 N) were decreased significantly following a period of taping (1720 N, SD 303 N) ( $P < 0.05$ ). There were no significant differences between the mean values of PFJRF among controls (1922 N, SD 398 N) and subjects with PFPS prior to taping ( $P > 0.05$ ) which might be due to small sample size in both groups and large variability observed in the study. Decreased values of PFJRF may explain the mechanism of pain reduction following patellar taping in subjects with PFPS.[22] Five patients were treated with a combination of thrust and nonthrust manipulation directed at the joints of the lower quarter, trunk and hip stabilization exercises,

patellar taping, and foot orthotics. Although a cause-and-effect relationship cannot be inferred from a case series, the outcomes achieved by the patients are consistent with studies incorporating manual physical therapy, exercise, patellar taping, and orthotic prescription to the management of conditions of the lower extremity.[23]

Patellar taping in combination with other treatment components such as quadriceps strengthening has become increasingly more common in rehabilitation of PFPS. This taping technique temporarily reduces pain by improving patella alignment, quadriceps function and patellofemoral joint function. Current research also shows that patellar taping may enhance the activation and/or timing of the VMO relative to the VL or decrease the activation and/or timing of the VL relative to the VMO resulting in a more harmonious balance in neural subsystem of the patellar joint. Based on the statistical analysis of pre and post test values shows  $P < 0.05$ . This study has investigated the effects of patellar taping with drop squat training program for patients experiencing PFPS. The two measurements tools utilized to evaluate the effectiveness of these treatments. Result of this study shows marked changes in pain level and improved PFJ function after treated with taping and drop squat. Lysholm scale show marked changes in the area of pain, support, instability, squatting. This study encourages the use of patellar taping and drop squatting exercise to correct biomechanical factors controlling patellar tracking.

#### *Limitations*

Less number of subjects used in this study. Only female athletes are used. This study only analysing muscle force imbalances. No control has been used in this study.

#### *Recommendation*

Further study needs to analysis the kinetic force changes in PFJ after applying taping and drop squat. Study needs with soft tissue techniques and flexibility exercises. Study

needs to analysis the different types of patellar taping. Similar study can be done to find out the efficacy of core strengthening program

## Conclusion

Patellar taping technique aims to realign the Patella and consequently reduce the pain level in the subjects with PFPS. Result of this study shows marked changes in pain level and improved PFJ function after treated with taping and drop squat. Lysholm scale show marked changes in the area of pain, support, instability, squatting. This study encourages the use of patellar taping and drop squatting exercise to correct biomechanical factors controlling patellar tracking.

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