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## Research Article

# EFFECT OF VASTUS MEDIALIS OBLIQUE STRENGTHENING IN PATELLOFEMORAL PAIN SYNDROME USING ELECTROMYOGRAPHY IN RECREATIONAL RUNNERS

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### ABSTRACT

Patellofemoral pain syndrome (PFPS) is a common disorder causing diffuse anterior knee pain. With the incidence in the general population being as high as one in four and even higher in athletic individuals. The aim of this study was to check effect of Vastus medialis oblique (VMO) strengthening in patellofemoral pain syndrome by using electromyography in recreational runners. Total 30 young individuals were included in the study according to the inclusion criteria. A 1 week program was selected where strengthening exercise of VMO was done daily. Pre and post visual analogue scale and electromyography was taken. After the end of study we found that there is significant improvement in VMO strength. Also the p value showed that there is significant increase in VMO strength. The study concluded VMO strengthening exercise are effective on patellofemoral pain syndrome in recreational runners.

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### INTRODUCTION

Patellofemoral pain syndrome (PFPS) is a common disorder causing diffuse anterior knee pain. With the incidence in the general population being as high as one in four and even higher in athletic individuals (1,2). Typically, Patellofemoral pain syndrome affects younger persons, 10-35 years of age, and is more common in females than males (3,4,5). Persons with Patellofemoral pain syndrome commonly report symptoms of aching pain in the retropatellar region which is increased with flexed knee postures, such as during squatting, sitting, stair climbing, or athletic activities (6,7,8).

Patellofemoral pain syndrome is generally considered to result from a combination of several factors, including quadriceps dysplasia, excessive foot pronation, increased Q angle, patella alta, or lateral retinacular tightness (9,2,10). Additionally, researchers and clinicians hypothesize that etiological factors include an imbalance between the vastusmedialis oblique and vastuslateralis, but research in this area is conflicting (9,11,10,12,13,2).

The vastusmedialis oblique (VMO) has an important role as a medial stabilizer of the patella and assists in the normal functioning of the patella femoral joint (14,15,2). If the vastus medialis oblique atrophies, it is believed that greater lateral deviation of the patella will occur, thus contributing to

abnormal patella femoral joint stress and, ultimately, Patellofemoral pain syndrome (10,16,2). Following this line of reason, rehabilitation specialists and researchers have advocated selective strengthening of the vastus medialis oblique to help restore normal patellofemoral biomechanics and reduce pain (17,11,16). The use of the faradic current to stimulate the vastusmedialis separate from the remainder of the quadriceps femoris muscle is an available option as the muscle group receives separate innervations from the femoral nerve." LeVeau and Rogers<sup>1</sup> believe that exercises to the quadriceps femoris muscles, though aimed at the vastusmedialis.

knee angle on the activation of the VMO and reported conflicting results on which position is most effective. The arguments are between a mid-range knee flexion (90 to 30 degrees) versus end-range extension position (30 to 0 degrees) [18,19].

Using a dynamic knee extension exercise would allow for activation of the VMO throughout the range of motion, which would satisfy both positions mentioned previously (20). Therefore, they studied the ability to selectively enhance vastusmedialis contraction while maintaining the vastuslateralis at its baseline level during quadriceps femoris muscle contraction with the assistance of electromyography. They found that in a period of 1 weeks, activity levels of the vastusmedialis could be altered in normal subjects. The fact

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that electromyography produced these changes in 1 weeks, whereas most exercise regimens for patellofemoral pain syndrome require considerably longer time periods.

**Aim**

To study the effect of Vastus medialis oblique strengthening in patellofemoral pain syndrome by using electromyography in recreational runners

**Objectives**

To check the strength of Vastus medialis oblique through electromyography in recreational runners and see it has a significant effect in reduce pain in patellofemoral pain syndrome.

**MATERIALS AND METHODS**

1. **Study design**-Experimental base
2. **Study setting**-Tilak Maharashtra Vidyapeeth OPD
3. **Target population**- Recreational Runner
4. **Sample size**-30

**Procrdure**

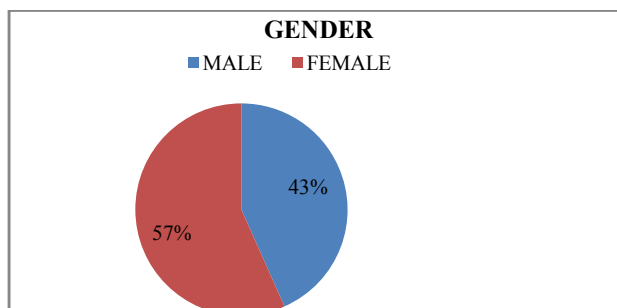
A brief explanation of the study was given to each patient including their full freedom to participate or withdraw from the study. Informed consent was taken from all the individuals.VAS (visual analogue scale) was taken to check the pain. The patient was positioned on a bed in a supine position to allow for comfort and check the strength of vastusmedialisobliquus muscle by electromyography. The therapist located the most electrically active portion of the vastus medialis oblique while having the patient perform pain-free vastusmedialisobliquus strengthening exercise.VAS was taken after exercise. The patient was then asked to perform pain- free vastusmedialisobliquus strengthening exercises .After one week patient vastus medialis obliquus strength was checked by electromyography.

**RESULT**

**Graph 1** Gender distribution among people with patello femoral pain syndrome

**Table 1**

M	A	L	E	F	E	M	A	L	E
1			3	1					7



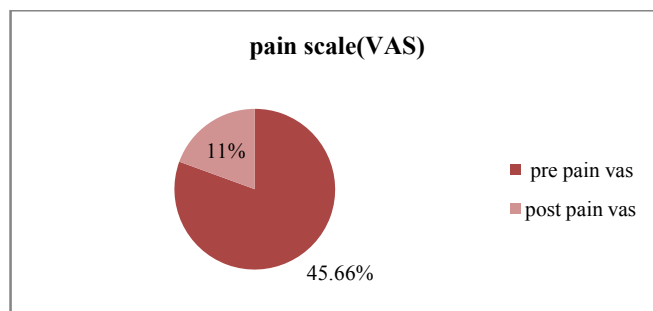
**Graph 1**

**Interpretation** -: In Female to male ratio, females had higher incidence of patello femoral pain syndrome than male

**GRAPH 4** Pain Scale (Vas)

**Table 4**

P	r	e	p	a	i	n	v	a	s	4	5	.	6	6	%	
P	o	s	t	p	a	i	n	v	a	s	1				1	%



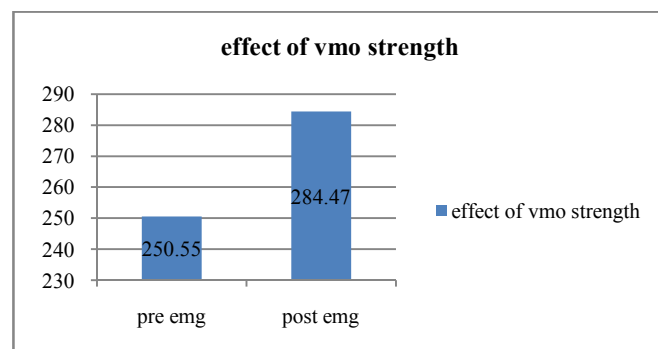
**Graph 4**

**Interpretation:** Pre pain was 45.66%.After strengthening exercise pain was 11%

**Graph 5** Effect of VMO Strength

**Table 5**

	M E A N ± S D	P v a l u e	D I F F E R E N C E
P r e e m g	250.55 ±63.412	0 . 0 2 6 7	- 3 3 . 9 2 3
P o s t e m g	284.47 ±63.841		



**Interpretation:-**There is statistically significant improvement in Patello femoral pain syndrome by vastus medialis oblique strengthening studied using EMG

**DISCUSSION**

In this study, effect of vastusmedialis oblique strengthening in patellofemoral pain syndrome using electromyography in recreational runners was checked. The vastusmedialisobliquus showed significantly increased in strength. Previous studies have focused on comparing the strength of vastus lateralis with vastusmedialis oblique. However, in this study, we had given strengthening exercise to vastusmedialisobliquus only and studied the improvement Contemporary rehabilitation strategies assume that physical therapy treatment is able to change motor control and that this is necessary for improvement of symptoms.

In the previous study, no significant differences were found in the Vastus medialis oblique: Vastus lateralis Electromyography proportion between the control and Patello femoral pain syndrome groups. These results are similar to that previously reported in the literature and indicate Vastus meadialis oblique recruitment in the Patello femoral pain syndrome group was similar to that of the control group regardless of the type of exercise. Other researchers have hypothesized that there will be

an increase in Vastus medialis oblique activity with external rotation of the hip because of the Vastus medialis oblique's muscular fibers originating from the adductor magnus muscle. Based on this thinking, when the hip is placed in an externally rotated position and flexed using the adductors, the VMO would be stimulated, therefore causing an increase in EMG activity. Debra Kushion study found, however, that there was no significant difference between VMO activation during lateral rotation or neutral positioning of the hip. In other study seen that there is an improvement in function may also have contributed to the change in Electromyography onset timing. The change in function may have resulted from biomechanical changes such as improved pelvic control, which may have reduced forces at the knee or provided a more stable attachment for the vastus medialis oblique, which was reflected by the change in motor control. These findings agree with other studies that have suggested that it is not possible to preferentially activate the VMO. All of the exercises tested produced relatively high Vastus medialis oblique/Vastus lateralis ratios, however this study indicates that there is a statistically significant increase in the Electromyography activity of the Vastus medialis oblique strength during the Short arc quads exercises over the Straight leg raised, regardless of hip position. So electromyography is use in this study to check the strength. In this study effect of vastus medialis oblique strengthening in patella femoral pain syndrome using electromyography in recreational runners we checked the strength of vastus medialis oblique by electromyography post one week of strengthening exercise. The result showed  $250.55 \pm 63.412 \mu\text{v}$  without strengthening exercise. After one week of strengthening exercise range was  $284.47 \pm 63.841 \mu\text{v}$ . Were with and without strengthening exercise of vastus medialis oblique difference was  $-33.923$ , p value is 0.0267 which shows statistically significant. This study provides a comprehensive physical therapy program incorporating vastusmedialisobliquus retraining with results in a change in the onset of vastusmedialisobliquus electromyography

## CONCLUSION

Vastus medialis oblique strengthening has significant effect in reducing pain in patellofemoral pain syndrome in recreational runners

### Limitation

The study was conducted on smaller sample size less duration. No follow up was done after the study.

### Scope

- More duration for strengthening exercise of vmo should be done.
- Biofeedback of emg can use for more effective result.

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