

Effect of VMO Strengthening Plus Patellar Mobilization with only Patellar Mobilization in Patient with Chondromalacia Patellae on Visual Analogous Scale and Lower Extremity Function Scale in Females with Age 20-60 years after 4 Weeks Follow Up

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Abstract: Chondromalacia patelle (CMP) is the softening of the cartilage fibrillation of patella. The objective of the study was to compare the outcome of VMO strengthening plus patellar mobilization and patellar mobilization alone on Lower Extremity functional scale (LEFS) in female with CMP. This Quasi experimental study comprised 60 females which were divided into two groups with 30 in each conducted at Haq orthopaedic hospital Lahore. Patellar mobilization and conventional treatment was given to Group A while VMO strengthening plus patella mobilization was given to group B. Wilcoxon signed rank test was used to analyze the significant difference between pre and post score. Mann whitney u-test was used to compare two groups. The findings of this study indicates that both treatments were equally effective, VMO strengthening with patellar mobilization has higher score than patellar's score alone

Keywords: VMO strengthening, Haq orthopaedic hospital Lahore, Patellar mobilization, Lower Extremity functional scale, Chondromalacia patelle

1. Introduction

Chondromalacia patellae (CMP) are a clinical entity in which there is anterior knee pain and it is defined as softening of cartilage and fibrillation of patella[1]. In CMP there is mainly complain of joint pain at the front of the knee and reduce in functional activity and contractures and muscle atrophy. A chondromalacia patella is also known as patellofemoral pain. Pain may be aggravate with prolong period of sitting posture and with activities that promote extra pressure to the knee joint. It can be associated with a disability which results as decrease in mobility and activities of daily living[2].

The chondromalacia was mostly located at the center of the patella and spread same to both of the (medial and lateral) facets. There were less and uncommon changes on femoral side[3].

The patella is the sesamoid bone and the main functions of the patella is to enhanced flexion effectively and to envelop the tibiofemoral joint from the harm[4]. The four important structures are very important in making the patella to stabilize which are the quadriceps and patellar tendons, lateral and medial retinaculum. The patella is not properly fixed in the patellar groove during the first degrees of flexion. If the four stabilizers of the patella are weak or

1.1 Overview

malaligned then there is decreased in stability of the joint and the chance of subluxation and dislocation increased[5]. The risk factors of developing CMP are the age, sex and sports activities. Age: Adolescents and adults are commonly effected and older populations have knee pain due of arthritis. Sex: Women are more common to develop patellofemoral pain. Because due to of wider pelvis which increases the Q angle. Sports activities: Excessive in running and jumping activities in sports can enhances the stress on the knee joint. Young female athletes has more chance of developing the of ligament injuries than male athletes. In females there is higher risk for osteoarthritis development[6]. Boling et al reported a prevalence of 15% for AKP among female cadets at the United States Naval Academy, and an incidence of 33/1000 person-years[7].

There are four grades which are designed to mention the severity of the pain. Grade I: In this grade softening of the cartilage occurs. Grade II: In grade second mainly two things occur, one is softening of the cartilage and the other is the erosion of the tissue. Grade III: There is thinning of cartilage and the tissue deterioration. Grade IV: There is the cartilage deterioration and the portion of the bone is exposed[8].

The incidence of the knee pain is increased with overweight and fault in biomechanics of the knee joint. Such as leg

length discrimination, injury to knee joint and malalignment[9]. CMP is a very painful condition which can be treated with a large number of interventions such as physical exercises of the joint and the muscles, fitness and modalities. The most important step of the rehabilitation is the education of the patient, how to prevent the joint from overuse and to use the joint in the proper alignment[10]. The strengthening of quadriceps, core stability and hip strengthening plays major role in reducing pain and gain functional activities. The exercises can involve concentric, eccentric, isotonic, isometric, isokinetic activities. The closed chain and open chain are also contributors in strengthening. Generally eccentric exercises are closed chain exercises including cycling, step repetitions and squatting. Open chain exercises are isotonic and isometric including straight leg raising[11]. Specifically the vastus medialis oblique (VMO) muscle is selected for selective strengthening. Because of the VMO's oblique attachment to the patella[12].

1.2 Objectives

The objective of this study is to compare the outcome of VMO strengthening plus patellar mobilization and patellar mobilization alone on LEFS in female with CMP.

1.3 Rationale

The rationale of the study is to decrease pain of the patient with CMP so that they can perform their activity of daily living (ADL) efficiently and improves the quality of life.

1.4 Operational Definitions

1.4.1 Chondromalacia patellae

Chondromalacia occurs due to the irritation of the surface under of the patella. Under the knee cap the patella is covered with a layer of smooth cartilage. When the patella rub with the undersurface knee joint, there is the sensation of the pain known as chondromalacia patellae (CMP).

1.4.2 Lower Extremity Functional Scale

The Lower Extremity Functional Scale (LEFS) is a questionnaire having 20 questions which tell about the ability of a person to perform activity of daily life. The LEFS can be used to evaluate the patient's initial level of function, progress and end result or outcome, as well as to set functional goals. It can be used to determine the patient's activities over time and to evaluate the effectiveness of an intervention. The LEFS is more effective to score and used for the purpose of research. LEFS is used to measure the level of dysfunction in lower extremity. It is benefit in clinical decision making, and it is reliable[13].

1.5 Materials and methods

1.5.1 Study Design

The present study is quasi experimental

1.5.2 Setting

The study was conducted in Haq Orthopedic Hospital sanada Road Lahore

1.5.3 Study Population

Female patients age 20 to 60 years having bilateral CMP

1.5.4 Duration of Study

The study took 4 months from November 2013 to February 2014 after approval from advance research committee

1.5.5 Sample size

The sample size was calculated by the following formula keeping the power of study equal to 90% and level of significance equal to 5%. The sample size should be 30 in each group. Total sample size is 60

$$n = \frac{\left\{ z_{1-\alpha} \sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)} \right\}^2}{(\bar{P}_1 - \bar{P}_2)^2}$$

$$\text{Where } \bar{p} = \left(\frac{p_1 + p_2}{2} \right)$$

(Sample Size determination in health studies version 2.0.21 WHO)

Level of significance 5%

Power of test 90%

Population proportion P1 =0.50} pilot study

Population proportion P2 =0.10}

P1 – P2 = 0.4

1.5.6 Eligibility

1.5.6.1 Inclusion Criteria

Female patients age 20 to 60 years having bilateral CMP

1.5.6.2 Exclusion Criteria

Female with Knee effusion

Tumor around knee joint

Any local or systemic disease

Traumatic injury

1.5.7 Data collection

The patient of CMP who visited the outpatient department of the Haq orthopedic hospital were taken. First I have taken the consent of permission from the head of the Haq orthopedic hospital for conducting research in his set up and I have also provided consent forms to patient. A structured questionnaire consisting of LEFS containing the variables(housework or school activities/ hobbies or sporting activities/ bath /Walking /Putting on shoes /Squatting/Lifting / light activities/ heavy activities/car activities/Walking 2 block/Walking a mile/Going stairs/Standing 1 hour/Sitting 1 hour/Running on even ground/Running on uneven ground /Making sharp turns /Hopping/Rolling in bed)was used to measure the score of difficulty. The patients were divided into two groups A and B.I have taken the score before the start of the treatment sessions. I have done patellar mobilization with standard protocol (shortwave diathermy, ultrasound massage) to group A and VMO strengthening plus patellar mobilization with standard protocol (shortwave diathermy, ultrasound massage) to group B.I have given 2 treatment sessions per week to the patients after that I have measured the score of two groups separately and compared the results of the two groups to know that which intervention

is more effective. The pre and post treatment score of VMO strengthening plus patellar mobilization and patellar mobilization alone were analyzed by Wilcoxon signed rank test. The comparison between the outcome of the two treatment was analyzed by Mann Whitney U-test.

1.5.8 Ethical consideration

The ethical committee and Department of physiotherapy of Haq Orthopedic approved to conduct the study in hospital. Only those patients were included in the study who signed the written consent. All the personal information of participants were kept hidden

1.5.9 Statistical Procedure

The data was analyzed by Statistical Package for Social Sciences (SPSS) version 20 as Descriptive statistical analysis. The difference between pre and post treatment was measured by Wilcoxon signed rank test because my data was not normally distributed and comparison between two treatments groups was measured by Mann Whitney u-test. Significance level was 0.05. Confidence interval 95% The data was presented in the form of tables and graphs.

2. Results

2.1 Statistics of age

Table 1: Descriptive statistics of age (years)

	Patellar	VMO + Patellar	Overall
<i>N</i>	30	30	60
<i>Mean</i>	32.63	26.97	29.80
<i>S.D</i>	11.55	8.25	10.42
<i>Minimum</i>	16	14	14
<i>Maximum</i>	55	47	55
<i>Age Range</i>	39	33	41

In Patellar treatment group the mean age of patients of 32.63 ± 11.55 years (minimum age = 16 years and maximum age = 55 years) and in VMO treatment group the mean age 26.97 ± 8.25 years (minimum age = 14 years and maximum age = 47 years).

2.2 Pre-treatment and Post-treatment score

Table 2: Descriptive statistics comparison of Pre and Post scores in both study groups

	Patellar		VMO + Patellar	
	Pre Score	Post Score	Pre Score	Post Score
<i>Median</i>	25	37.00	19.00	49.00
<i>25th Percentile</i>	14.75	27.50	12.75	39.00
<i>7th Percentile</i>	37.50	47.25	26.25	61.75
<i>Inter quartile range</i>	22.75	19.75	13.5	22.75
<i>p-value (Wilcoxon Test)</i>	0.0000		0.0000	

The median \pm I.Q.R was statistically improved in both groups when compared individually for each groups (25 ± 22.75 and 37 ± 19.75 , $p\text{-value} = 0.0000$ in patellar group and 19.00 ± 13.5 vs. 49 ± 22.75 , $p\text{-value} = 0.0000$ in VMO and Patellar group).

2.3 Pre and Post scores in both study groups

Table 3: Comparison of Pre and Post scores in both study groups

	Pre Score		Post Score	
	Patellar	VMO + Patellar	Patellar	VMO + Patellar
<i>Median</i>	25	19.00	37.00	49.00
<i>25th Percentile</i>	14.75	12.75	27.50	39.00
<i>7th Percentile</i>	37.50	26.25	47.25	61.75
<i>Inter quartile range (I.Q.R)</i>	22.75	13.5	19.75	22.75
<i>p-value (Mann Whitney U-test)</i>	0.087		0.001	

The median \pm I.Q.R was statistically same in both groups when compared on pre treatment. (25 ± 22.75 and 19.00 ± 13.5 , $p\text{-value} = 0.087$). After treatment the median \pm I.Q.R was statistically higher and significant in VMO+ Patellar treatment group as compared to Patellar group (49 ± 22.75 vs. 37 ± 19.75 , $p\text{-value} = 0.001$).

The mean \pm I.Q.R was higher (showing more change) in VMO \pm Patellar as compare to Patellar group with significant $p\text{-value} < 0.001$.

2.4 Descriptive statistics and comparison of Change in score

Table 4: Descriptive statistics and comparison of Change in score after treatment in both study groups

	Change in score after treatment	
	Patellar	VMO + Patellar
<i>Median</i>	9	33
<i>25th Percentile</i>	4.75	18
<i>7th Percentile</i>	12.75	38.50
<i>Inter quartile range</i>	8.00	20.5
<i>p-value (Mann Whitney U-test)</i>	0.0000	

3. Conclusion

This study has concluded that both treatment option were effective. In comparison between two treatments the VMO strengthening plus patellar mobilization has higher score on LEFS as compare to patellar mobilization alone so the VMO strengthening plus patellar mobilization technique was better than the patellar mobilization technique alone in decreasing the difficulty level during the activity of daily living in patient with Chondromalacia patellae. The $p\text{-value}$ 0.001 was consider significant at 5%

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