

length discriminancy, 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 contributes 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

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

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

(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>7^{5th} 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 ± I.Q.R was statistically improved in both groups when compared individually for each groups (25 ± 22.75 and 37 ± 19.75, *p-value* = 0.0000 in patellar group and 19.00 ± 13.5 vs. 49 ± 22.75, *p-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>7^{5th} 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 ± I.Q.R was statistically same in both groups when compared on pre treatment. (25 ± 22.75 and 19.00 ± 13.5, *p-value* = 0.087). After treatment the median ± 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-value* = 0.001).

The mean ± I.Q.R was higher (showing more change) in VMO ± Patellar as compare to Patellar group with significant *p-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>7^{5th} 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-value* 0.001 was consider significant at 5%

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