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ORIGINAL ARTICLE

Effects of Mulligan Pain Release Phenomenon Technique in Management of Patellofemoral Pain Syndrome: RCT

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ABSTRACT

Background: Anterior knee pain is one of the common musculoskeletal problems seen in children adolescents and adults.
Aim: To find the effects of Mulligan PRP technique in the management of patients with patellofemoral pain syndrome.
Study design: Randomized Control Trial.
Methodology: A randomized clinical trial was conducted with a sample of 45 patients. Equal no. of participants were allocated randomly in 3groups through computer generated random number table i.e. A (compression group), B (distraction group), C (conventional group) and allocation was kept concealed. Mulligan's pain release phenomena with 3 different modifications were administered to the study groups. The duration of study was. Outcome measures were pain, knee range of motion, functional capability measured through Visual analogue scale (VAS), goniometer, and lower extremity functional scale (LEFS) respectively. Outcomes were measured at baseline and 4 weeks after the treatment. Data was analyzed by SPSS version 19. ANOVA was applied to find the outcomes while P ≤0.05 was considered significant.
Results: The results of comparison among groups showed that knee ROM (P= 0.678), LEFS (P=0.027) and for VAS (P=0.163). The results showed that PRP is more effective in improving functional outcomes, whereas pain although improved through PRP; does not prove it a superior treatment when compared to others.
Conclusion: We concluded that Mulligan's Pain Release phenomena is an effective treatment in the management of patellofemoral pain syndrome in terms of functional outcomes.
Keywords: Patellofemoral Pain syndrome, Mulligan's Pain Release Phenomenon, Visual Analogue Scale,

INTRODUCTION

Anterior knee pain is one of the common musculoskeletal problems seen in children adolescents and adults.[1] More often knee pain felt between patella and retinaculum is described as Patellofemoral pain[2]. Commonly used terms are patellar pain, patellofemoral arthralgia and patellofemoral pain.The clinical record of the different sports clinic still records a high percentage of patients with knee pain[3].

The femoropatellar joint comprises of the patella and the femoral trochlea. The patella being a sesamoid bone acts as a pulley and alters the angle of pull for patellofemoral tendon and affects the moment arm of the patellofemoral joint. At 20 degrees of Knee flexion, Contact of the patella with the femur is initiated and increases with progressing knee flexion, reaching a maximum at 90 degrees[4].

Major contributing factors include abnormalities in extensor mechanism, Q angle variation, articular mal alignment of lower limb[5] abnormal patellar tracking and dynamic valgus. Barton *et al*. stated that patients with PFP had altered foot mechanics.[6] The most extensively used treatment options are NSAID, quadriceps strengthening exercise and manual therapy with the aim to reduce pain and disability. The intensity and duration of exercises depend on the patient's individual needs and lifestyle[7].

The Pain Release Phenomenon (PRP) Technique is one of the manual therapy techniques introduced by Brian Mulligan for the management of chronic pain in the extremity joints[8]. Joshi *et al*. found Maitland compression technique more effective than routine physical therapy in improving peripheral joint hypomobility. Compression therapy, that if applicable, in synovial joints a compression component can be added into the testing of joint movements[9]. Another study reported that compression therapy to treat patellar misalignment syndrome is useful in realignment and functional outcomes[10]. According to a systematic review static or dynamic quadriceps strengthening exercises along with an intervention or without it were beneficial for the treatment of PFP[11]. A comprehensive physical therapy treatment must include manual procedures, bracing, compression bandage, orthotics and also mental health support[12,13]. There is a limited number of good quality evidence for the treatment of PFP syndrome.

The objective of the study was to find the effects of Mulligan PRP technique in the management of patients with patellofemoral pain syndrome.

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METHODOLOGY

After permission from Institutional Ethical Review Board, this single blind randomized controlled clinical trial conducted at Outpatient physiotherapy department of Amin Welfare Teaching Hospital Sialkot, Pakistan. Sample size was estimated through effect size method, with 95% confidence interval and 5% margin of error. After ethical approval 45 patients with anterior knee pain were recruited. Written informed consent was taken from each participant prior to inclusion in the study.

Patients with the confirmed diagnosis of patellofemoral pain (PFP) syndrome were encompassed in the study. Patients of either gender aged 35-65 years and with positive provocation test for patella were considered. Whereas patients having the history of trauma, Infection Tumors around the knee, Rheumatoid Arthritis, ligamentous injury, Joint hyper mobility and Inability to comply with the study protocol due to cognitive impairment were excluded from the study.

Total 60 patients with PFP syndrome that reported to the outpatient department were screened. After finding their suitability as per inclusion and exclusion criteria, written consent was obtained from them and 45 participants were registered in the study. Patients were randomly divided into 3 groups using a computer generated random number table of 15 patients each. Their demographic data was obtained, pain intensity through 1-10 cm visual analogue scale (VAS)[14], knee joint range of motion (flexion/extension) through goniometer[15], and functional limitations were assessed through lower extremity functional scale (LEFS).[16] Readings were taken at the baseline before the treatment and,

after one week. The participants were divided into three groups: Group A, Group B and Group C. Group A included 15 patients who were treated by quadriceps isometrics (10×10) and PRP technique. Group B received 10×10 isometrics and patellofemoral distraction. Group C received 10×10 quadriceps isometric contractions only. Treatment sessions were given on twice a week over the course of the three week. Outcome assessor was kept blind.

Pain Release Phenomenon (PRP): PRP is a pain provoking technique, and the pain is resolved within 25-30 seconds (for knee joint). Pain is evaluated at the range where it started. Pressure was maintained for 15-20 seconds. After getting release from pain within 15-20 seconds, PRP in a new range was applied with increase force, until a substantial amount of pain reduction was achieved. The outcome measures were recorded in the form of VAS, LEFS and Knee ROM.

Statistical analysis: Data was found normally distributed through Shapiro-Wilk test. Descriptive statistics were used to measure mean baseline values for both groups. The ANOVA was used to analyze the effect of the PRP on PFP syndrome. The significance level was $p \leq 0.05$.

RESULTS

The sample was composed of 45 patients with age range 35-65 years. Twenty six (56.78%) patients were male and nineteen (43.22%) were females. Eighteen patients (40%) had lateral knee pain, while 16 patients (35.6%) had medial knee pain and 11 patients (24.4%) reported retro patellar pain. The comparative evaluation between groups shows the knee ROM p- value to be 0.678, LEFS 0.027 and for VAS 0.163 as shown in Table-1. The result displays that in case of group comparison there exists a significant value for the LEFS while ROM and the VAS are not significant. The multiple comparison analysis between the groups shows that Mulligan PRP through compression is more effective as compared to distraction and control group in terms of LEFS, having a value of 0.032 in compression and control group while in case of distraction and control group though the effective treatment but is no significant p-value 0.081.

Whereas comparison among the outcome measures VAS, and knee ROM showed non-significant values hence having no superior efficacy over one another. There is considerable reduction in pain in a compression group as compared to distraction and control group as shown in Table-2.

Table-1: Pre versus Post intervention values of outcome variables

Groups	Group-A Pre Versus Post		Group-B Pre Versus Post		Group-C Pre Versus Post	
	Mean±SD	P Value	Mean±SD	P Value	Mean±SD	P Value
Knee Range of motion	-2.60±3.19	0.006*	-2.00±3.16	0.028*	-1.66±2.43	.019
Visual analogue scale	2.6±1.45	0.000*	3.00±1.25	0.000*	2.13±1.50	0.000*
Lower extremity function scale	-1.02±7.47	0.000*	-1.30±3.93	0.000*	-6.73±6.07	.001*

*Statistically significant.

Table-2: Results of ANOVA

Post Intervention Values		Sum of Squares	Df	Mean Square	F	P value
Knee ROM	Between Groups	23.333	2	11.667	.268	.678
	Within Groups	1826.667	42	43.492		
	Total	1850.000	44			
LEFS	Between Groups	621.733	2	310.867	3.974	.07
	Within Groups	3285.467	42	78.225		
	Total	3907.200	44			
VAS	Between Groups	8.711	2	4.356	1.980	.163
	Within Groups	92.400	42	2.200		
	Total	101.111	44			

DISCUSSION

According to the results obtained from our clinical trial both the conventional treatment and application of distraction technique in form of pain release phenomenon work for the patients. Patients assigned to all the three groups showed improvement in terms of pain, range and functional status; however more improvement was seen in LEFS in the compression group. There was a quick pain relief in compression group, at the time of treatment however over the course of one week patients reported the same for distraction and control group. We found that Mulligan's Pain release Phenomena in combination with strengthening exercises is effective in reducing the pain, improving Knee ROM and enhancing functional abilities of patients with PFP Syndrome. There are limited treatment methods for the managment of patellofemoral pain focusing mainly on bracing and activity restriction along with quadriceps isometrics. This particular study intended to find out the outcome of an innovative treatment approach PRP devised by Mulligan through the compression of patellofemoral joint.

Anterior knee pain is one of the common conditions among middle to senile age population. Depending on the extent and severity most of the patients complain of pain around the patella whether medial, lateral or posterior to it. Most widely used treatment is to strengthen and stretch the muscular compartments along with the activity modification but almost no importance is given to articular and periarticular adhesions[17].

In a randomized controlled trial Mulligan pain release phenomenon was studied in comparison with routine physical therapy treatment. Eighty patients with ≤40 year of age were studied and pain release phenomenon was found to be an effective treatment approach in reducing knee pain and improving knee function[8]. The results of this study support our results in terms of knee's function but according to our results pain was equally improved in PRP and routine physical therapy group and it has no superiority. According to a systematic review by Victoria et physical therapy combined with manual therapy has favorable effect in reducing pain and improving knee function.[18] In this study five RCTs were evaluated and the results of this review are in accordance with our results where the PRP group combined with knee isometrics showed improvement in knee dysfunction. Bhosale et al used PRP technique in combination with kinesio tape in 30 patients with chronic Osteoarthritis and found it an effective treatment regime.[19] Patients were divided into two groups but it is not clear from results that kinesiotape is effective in improving knee function or PRP. In contrast, we divided our patients in 3 groups to have a better understanding of effectiveness of the right treatment approach

Limitations: Small sample size, single study Centre and inclusion of patients with early osteoarthritis only.

CONCLUSION

We concluded that Mulligan's pain release phenomenon along with knee strengthening exercises is effective in terms of functional well-being and quick pain relief. The PRP can be used as a therapy of choice in patients with PFP syndrome.

Authors' Contribution: SA & MJ: Conception & design of study, **SM & MUA:** Data collection & Analysis, **MC, WP:** Drafting of manuscript.
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