

# The Effectiveness Of Kaltenborn Mobilization Versus Maitland Mobilization On Patellofemoral Pain Syndrome An Experimental Study

Dr. D.Shabiethaa<sup>1</sup>, Dr. Jeyakumar.S<sup>2</sup>, Dr. Swetal Prakash<sup>3</sup>, Dr. Saravanan<sup>4</sup>, Dr. Vincent Prabhakaran Sekar<sup>5</sup>, Dr. Anusha M C<sup>6</sup>, Dr. Smruti Swagatika Dash<sup>7</sup>

<sup>1</sup>(PT) M.PT.,Ph.D Research Scholar – School of Health Sciences, Department of Physiotherapy, Garden City University, Bangalore Also Associate Professor -YMT college of Physiotherapy, Navi Mumbai.

<sup>2</sup>(PT) Professor and Research Supervisor, Department of Physiotherapy, School of Health Sciences, Garden City University, Bengaluru, Karnataka, India.

<sup>3</sup>B.PTh (PT) YMT college of Physiotherapy, Kharghar

<sup>4</sup>V.S. (PT) Ph.D Research Scholar –School of Health Sciences, Department of Physiotherapy, Garden City University, Bangalore, and Professor/Principal – Mohamed Sathak AJ College of Physiotherapy, Nungambakkam, Chennai

<sup>5</sup>(PT)Ph.D Research Scholar – School of Health Sciences, Department of Physiotherapy, Garden City University, Bangalore.

<sup>6</sup>(PT) Ph.D Scholar Garden City University, Bangalore, Assistant Professor at Prudence college of Physiotherapy, Bangalore.

<sup>7</sup>(PT) Ph.D Scholar Gardencity University, Bangalore and Professor, Narayana Hrudayalaya Institute of Physiotherapy, Bangalore.

## Abstract:

**Background of the study:** Patellofemoral pain syndrome (PFPS) is a common musculoskeletal disorder affecting the knee, often causing significant discomfort and functional limitations. Manual therapy techniques, including joint mobilization, have shown promise in managing PFPS symptoms. Kaltenborn and Maitland mobilization are two widely used approaches in physical therapy, each with its unique principles and application methods. Comparing the effectiveness of these techniques specifically for PFPS can provide valuable insights for clinicians in selecting optimal treatment strategies.

**Aim:** To compare the effectiveness of Kaltenborn Mobilization versus Maitland Mobilization on patellofemoral pain syndrome.

**Materials and Method:** 40 patients with patellofemoral pain syndrome were randomly divided into two groups. Group A (n=20) participants were treated with Maitland mobilisation. Group B (n=20) participants were treated with Kaltenborn mobilization. Three sessions were given in a week for four weeks. Materials used were universal goniometer, numeric pain rating scale, Lysholm knee scoring scale.

**Result :** Comparison of Maitland mobilisation versus Kaltenborn mobilisation in patellofemoral syndrome for 3 days in a week for 4 weeks using paired “t” test shows to be significant in improvement in Kaltenborn mobilisation.

**Conclusion:** The study shows that Kaltenborn mobilization appears to be more effective than Maitland mobilization for treating patellofemoral pain syndrome.

**Key words:** Patellofemoral Pain syndrome, Kaltenborn Mobilization, Maitland mobilization.

## INTRODUCTION:

Patellofemoral pain syndrome is a common condition associated with overuse injuries of the lower extremity<sup>[1]</sup>. It is one of the most common causes of anterior knee pain encountered in the outpatient setting<sup>[2]</sup>. Females are at two times higher risk of Patellofemoral pain than males, especially young active females.<sup>[3]</sup> The most frequently diagnosed condition in adolescents and adults with knee complaints is Patellofemoral pain syndrome. Patellofemoral pain syndrome is a common condition associated with overuse injuries of the lower extremity<sup>[1]</sup>

It is one of the most common causes of anterior knee pain encountered in the outpatient setting [2]. Females are at two times higher risk of Patellofemoral pain than males, especially young active females. [3]. The most frequently diagnosed condition in adolescents and adults with knee complaints is Patellofemoral pain. Patellofemoral pain syndrome characterized by anterior knee pain which tends to worsen with activity of daily living, like prolonged sitting with knee-bend, walking, squatting, running and jumping [1]. Patellofemoral pain due to malalignment or a biomechanical dysfunction includes impairments that cause an increased functional Q-angle [5]

There is usually abnormal patellar tracking, and there may be discordant firing of the quadriceps muscle [5]. Patellar mal tracking is believed to play a role in patellofemoral pain syndrome [5]. Patellar maltracking, or lateral translation, increases with load bearing positions such as squatting [5]. Stimulation of nerve ending within retinacula, Hoffa (infrapatellar) fat pad, and peripatellar synovium may also contribute to the development of patellofemoral pain syndrome. [5]

Exercise therapy include muscle strengthening, stretching, isometric and resisted exercises [1]. Mobilization is a passive, skilled manual therapy techniques applied to joints and related soft tissues at varying speeds and amplitudes using physiological or accessory motions for therapeutic purposes [5]. The oscillatory technique suggested by Maitland [8]. The sustained stretch technique suggested by Kaltenborn [9]. The Maitland mobilization and techniques are both passive treatments, but they differ in that Maitland mobilization uses oscillation while kaltenborn mobilization uses sustained stretching [10]

In Maitland's mobilization, passive physiological and accessory oscillatory movements are applied to gain range of motion, lost due to pain or stiffness, and to restore optimal kinematics between the joint surfaces, where the grade, frequency and dosage of mobilization are determined by severity, irritability and nature of the disorder [11]. Kaltenborn mobilization involves the application of a passive sustained stretch technique to enhance joint mobility without articular surface suppression. The forces applied to increase joint mobility are graded from I-III [12]

The therapeutic purpose of this technique is improving range of motion, pain relief, reduction of muscle guarding, and effusion reduction. According to a study, afferent inputs from the surrounding tissues alter motor regulation at joint dysfunction which can be responsible for the weakness of the muscle [1]. The gastrocnemius, soleus, quadriceps, and hamstring muscles have been identified as specific muscles with decreased flexibility in individuals with patellofemoral dysfunction [5]. Strengthening exercises and flexibility training of the associated muscle groups should be performed three times per week for four weeks [2]. Function training is imperative to strengthen the knee musculature using modifications of functional activities, progressing the difficulty as strength improves. [5]

#### **Need of the study:**

Patellofemoral pain syndrome is common around age 25-35. This can lead to chronic knee pain if untreated, also there are very less studies to show the effectiveness of Kaltenborn versus Maitland mobilization in patellofemoral pain syndrome.

#### **MATERIAL AND METHODS:**

An experimental method was performed on 20 patients of patellofemoral pain syndrome in two groups each both male and female of age group 25-35 years using convenient sampling method, fulfilling the inclusion criteria of Patient should be under the age group of 25-35 years. Patella Clarke's test should be positive,

Patient able to read and understand English and Patient should be willing to participate and the exclusion criteria of Symptoms or signs of any intra-articular derangement of the knee joint, such as effusion, ligament laxity, and meniscal tear, Patellar tendon pathology. Degenerative conditions like osteoarthritis, Osgood-Schlatter disease or Sending-Larsen-Johansson disease and patients who are not willing to participate.

The Pre and Post outcome measures were Numeric Pain rating scale, Knee- Range of motion and Lysholm knee score scale were assessed at Prior to the treatment and at the end of fourth week. Patients were divided into Group A with conventional therapy and Maitland Mobilization and Group B with Conventional therapy and Kaltonborn Mobilization were conventional Therapy consists of Hot Packs, Stretching to gastrocnemius soleus, hamstring, tensor fascia lata and Iliotibial band, VMO Muscle Strengthening-Wall squat with 40° -60° knee flexion with hip adduction.

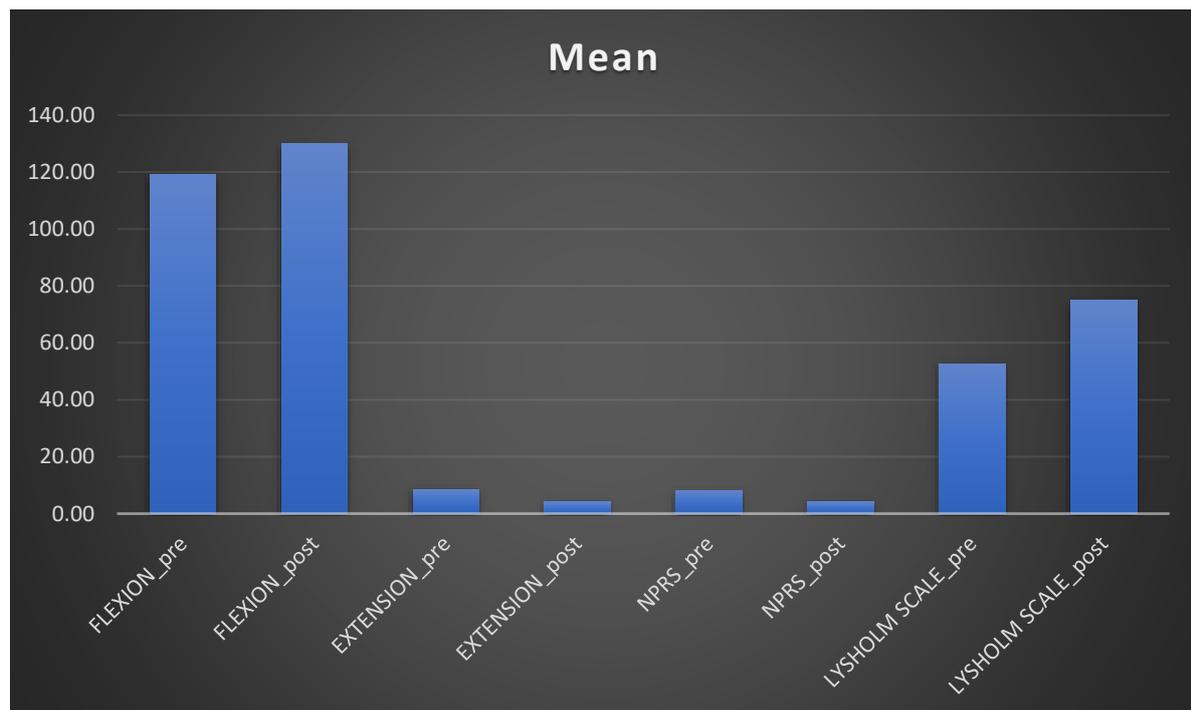
**TABULATION AND INTERPRETATION ON COMPARING MAITLAND MOBILISATION VERSUS KALTENBORN MOBILISATION:**

Maitland mobilisation

**TABLE 1:**

Variable	Mean	N	Std. Deviation	Sig.
Pre test flexion	119.10	20	2.490	0.090
Post test flexion	129.95	20	6.362	
Pre test extension	8.50	20	1.051	0.089
Post test extension	4.10	20	2.693	
Pre test NPRS	8.10	20	0.718	0.075
Post test NPRS	4.30	20	2.055	
Pre test lysholm scale	52.70	20	3.080	0.404
Post test lysholm scale	74.90	20	14.920	

**GRAPH 1:**



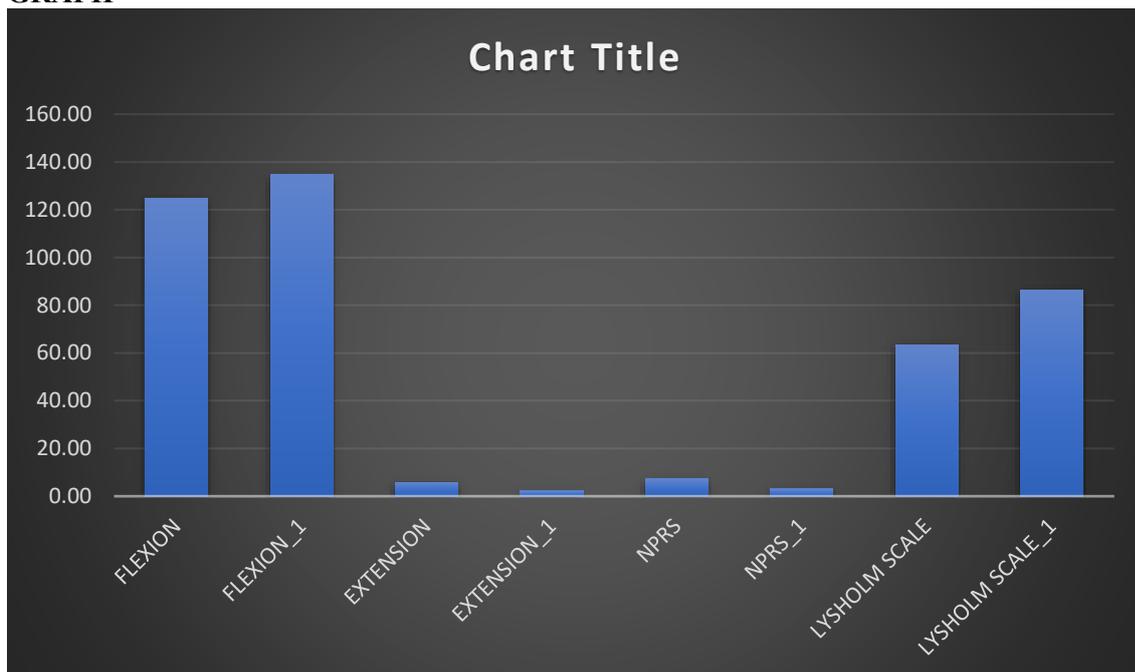
**Kaltenborn mobilisation**

**TABLE 2:**

<b>Paired Sample t test</b>				
<b>Variables</b>	<b>Mean</b>	<b>N</b>	<b>Std. Deviation</b>	<b>Sig. (2-tailed)</b>
<b>Pre test flexion</b>	124.65	20	3.787	0.000
<b>Post test flexion</b>	134.60	20	3.545	
<b>Pre test extension</b>	5.90	20	1.619	0.000
<b>Post test extension</b>	2.25	20	1.293	
<b>Pre test NPRS</b>	7.20	20	0.768	0.000
<b>Post test NPRS</b>	3.00	20	1.170	
<b>pre test lysholm scale</b>	63.50	20	5.073	0.000
<b>Post test lysholm scale</b>	86.45	20	5.568	

**GRAPH**

**2:**



**RESULTS**

All statistical Data was analysed by experimental method using Students “t” test. Microsoft word and excel using SPSS 22.0. The data was presented as mean ± standard deviation with maitland mobilisation considering for 20 samples in total with 13 females and 7 males and kaltenborn mobilisation consisting of 11 females and 9 males with the total sample size being 40.

Paired t test was used to analyse the data as shown in Table 1, Maitland mobilisation that there was no statistically significance between pre- and post-intervention measurements for the variables tested, including Range of motion like flexion and extension, pain levels measured using (NPRS), and the Functional activity using Lysholm scale. Despite some improvements in means, particularly in pain reduction and Lysholm scores, the p-values for all comparisons exceeded 0.05, suggesting these changes were not significant. Graphical presentation of maitland mobilization is shown in Graph:1

Paired t test was used to analyse the data shown in Table :2 kaltenborn mobilization showing significant improvement, across all measured parameters post-intervention. Including Range of motion like flexion and extension, pain levels measured using (NPRS), and the Functional activity using Lysholm scale shows significant improvement of  $p < 0.05$ , indicating effective changes. Graphical presentation of Kaltenborn mobilization is shown in Graph :2

Table :3 shows the intra group comparison using unpaired t test having significant differences between the Maitland and Kaltenborn groups across various parameters. The Kaltenborn group showed significantly better outcomes in range of motion both in flexion and extension, Lysholm Scale scores, both pre- and post-intervention ( $p < 0.05$ ). The Maitland group had higher initial pain scores (NPRS) but showed less improvement compared to Kaltenborn. Overall, the Kaltenborn method appears to be more effective in improving joint range of motion and reducing pain.

## DISCUSSION

The study conducted to compare the effectiveness of maitland mobilization versus kaltenborn mobilisation having 20 patients in one group, Group A – maitland mobilisation and group B – kaltenborn mobilization along with---- for 4 weeks (3 days in a week). Also according to kisner and In further studies show that kaltenborn is effective in pain reduction and improvement function by petty and moore et al (2001)<sup>[13]</sup>

This experimental study compared the effectiveness of Kaltenborn and Maitland mobilization techniques in treating Patellofemoral Pain Syndrome (PFPS). The results indicate that Kaltenborn mobilization was more effective than Maitland mobilization in reducing pain and improving function in patients with Patellofemoral Pain Syndrome (PFPS). According to Crossley et al.(2016) states that kaltenborn mobilization focuses on specific joint movement and exercise program designed shows effectiveness in patellofemoral pain syndrome<sup>[14]</sup>

Colby et al(2012) state that kaltenborn is more effective in issues associated with pain<sup>[15]</sup>

The superior outcomes observed with Kaltenborn mobilization may be attributed to its focus on joint-play techniques and the restoration of arthrokinematic movements. Kaltenborn's approach emphasizes the correction of positional faults and the improvement of joint mobility, which are often compromised in PFPS patients (Kaltenborn et al., 2003). This targeted approach may address the underlying biomechanical issues more effectively than the oscillatory techniques employed in Maitland mobilization.<sup>[16]</sup>

Our findings align with previous studies that have demonstrated the efficacy of Kaltenborn mobilization in managing various musculoskeletal conditions. For instance, Vicenzino et al. (2011) reported significant improvements in pain and function when using Kaltenborn techniques for lateral epicondylalgia. Similarly, Crossley et al. (2016) found that interventions targeting patellofemoral joint mechanics, to Kaltenborn's approach, yielded better outcomes in PFPS patients.<sup>[17] [18]</sup>

When compared with maitland this study shows less effectiveness as according to power at al(2017) other than joint mobility it neglects other contributing factor which may be the lesser in case of patellofemoral syndrome<sup>[19]</sup> Also with respect to systematic review done by crossley at al(2016) there is limited high quality evidence supporting maitland mobilization<sup>[20]</sup>

While Maitland mobilization also showed improvements in patient outcomes, the results were less pronounced compared to Kaltenborn techniques. This difference could be due to Maitland's emphasis

on pain modulation through oscillatory movements, which may not address the specific joint mechanics as comprehensively as Kaltenborn's method (Hengeveld & Banks et al.2014)<sup>[21]</sup>

Future research should investigate the long-term effects of these mobilization techniques and explore potential combinations with other interventions, such as exercise therapy or taping, to optimize PFPS management. Additionally, studies examining the underlying mechanisms of action for both techniques could provide valuable insights into their differential effects on patellofemoral joint function.

In conclusion, this study provides evidence supporting the superior effectiveness of Kaltenborn mobilization over Maitland mobilization in the treatment of PFPS. These findings can guide clinicians in selecting appropriate manual therapy techniques for PFPS patients and contribute to the development of more targeted and effective treatment protocols.

## CONCLUSION

The study shows that kaltenborn mobilization appears to be more effective than Maitland mobilization for treating patellofemoral pain syndrome.

**Ethical Clearance:** Taken from the institutional ethical committee.

**Funding:** Self

**Conflict of Interest:** Nil

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