

## Research Article

# Effectiveness of Post Isometric Relaxation Versus Reciprocal Inhibition Technique on Hamstring Muscle Flexibility

Asma Aleem<sup>1</sup>, Muhammad Tariq Arfan<sup>2</sup>, Ayesha Razzaq<sup>3</sup>, Rooh ul Husnain Khizar<sup>4</sup>, Mehboob Ali<sup>5</sup>

<sup>1,4</sup>*School of Physical Therapy, Khaldunia Institute of Technology and Applied Sciences, Lahore,* <sup>2</sup>*Director, IT Department, KEMU,* <sup>3</sup>*Physiotherapy Department Mayo Hospital, Lahore,* <sup>5</sup>*School of Physical Therapy, Central Park Medical College, Lahore*

### Abstract:

**Background:** To expand the muscular extensibility, alternation of muscle energy techniques have been upheld, yet proof present to help the general value of a specific methodology. Two strategies of muscle energy techniques have been explored in the osteopathic writing that differs principally in the group of muscles focused on.

**Objective:** The objective of our study was to find out the effectiveness of post isometric relaxation and reciprocal inhibition technique on hamstring muscle flexibility among students of Johar Institute of Professional Studies Lahore.

**Methods:** The Quasi-experimental study was for comparison of two Relaxation Techniques with 50 healthy students of both gender were recruited by non-probability convenient sampling technique from different department of Johar Institute of Professional Studies Lahore from 1<sup>st</sup> October to March 2020. For enrolling the subjects in this study we used convenience sampling technique. Furthermore, 50 subjects were selected on the basis of inclusion exclusion criteria and were arbitrarily divided in to two groups with 25 in each group. Hamstring length was assessed using AKE test. For intervention, Group A performed post isometrics relaxation and Group B performed Reciprocal Inhibition Technique. Knee range of motion was assessed pre-intervention and post-intervention. Numeric Pain Rating Scale (NPRS) and Universal Goniometer were assessment tools accessed for all patients before and after 4 weeks of physical therapy intervention. Data were documented and analysis was done using SPSS version 20. Paired sample t-test and independent sample t-test was applied to find association between the variables of hypothesis.

**Results:** In both groups, the pre-intervention and post-intervention measurements by statistical analysis found that there is significant improvement in hamstring muscle flexibility with P value  $\leq 0.05$  for both right side and left side.

**Conclusion:** The current study found out that both post isometric relaxation and reciprocal inhibition are equally beneficial in the treatment of tight hamstrings.

**Corresponding Author** | Asma Aleem, Lecturer, School of Physical Therapy, Khaldunia Institute of Technology and Applied Sciences, Lahore **Email:** asmaaleem26@gmail.com

**Key words:** Hamstring muscle, tight hamstrings, post isometric relaxation, reciprocal inhibition, muscle length

### Introduction:

A musculoskeletal condition is defined as any damage, injury, or pathology that affects body tissue, muscle, joint, or ligament. Due to increased workload, poor posture, and everyday activities, the prevalence of musculoskeletal disorders is on the rise these days. Musculoskeletal problems affect everyone at some point during their lives. Pain, stiffness, edema, and joint restriction are all signs and symptoms. Musculoskeletal dis-

orders include discomfort in the shoulders, low back, tendinitis, sprains, and strains<sup>1</sup>.

Low back pain is now recognized as a worldwide health issue that affects people of all cultures in equal quantities. It is one of the primary factors that restricts everyday activities and, as a result, affects the daily activity of living and daily task achievement of those afflicted. Systematic evaluations reveal a significant prevalence of backache in adults, which might be classified as a chro-

nic condition<sup>2</sup>.

The existence of persistent low back pain depends on different factors such as, physical performance, age, gender, cigarette smoking, work related factors and changes in muscles, ligaments and bone mineral density. Hamstring muscle stiffness or tightness is one of the muscular alterations. Anatomy of pelvic region are affected by changes in hamstring muscle flexibility<sup>3</sup>.

The hamstring is a group of muscles that govern hip and knee joint mobility as well as the pelvis and spine's alignment. Since a result, they play a crucial role in postural alignment, as hamstring shortening can lead to lumbar hypo lordosis and a posterior pelvic tilt. Lower back and lower limb discomfort, including hip, knee, and ankle joint pain, may come from changes in body posture caused by hamstring shortening. Limited hamstring muscle flexibility has been linked to the occurrence of low back pain in studies<sup>4</sup>.

Hamstring muscle tension is quite common and looks to be rising among the youth, as seen by the 40.17 percent frequency of hamstring tightness among undergraduate physical therapy students of Kathmandu University<sup>5</sup>. Hamstring tightness impacts on body posture and causes abnormal pelvic tilt in sitting position<sup>6</sup>. Higher intra discal pressure and compression force predispose and cause spinal disorders. Flexibility exercise for the hamstrings has long been regarded an important part of posture improvement. Stretching therapies have been shown to increase flexibility and pelvic posture, however the regimens employed vary greatly. Stretches ranging from 15 seconds to 120 seconds are used in studies to promote hamstring muscle flexibility. Many researches comparing thirty and sixty seconds concluded that thirty seconds is enough to increase range of motion (ROM). Odunaya et al., on the other hand, tested several stretching persistence durations (fifteen, thirty, sixty, ninety and one hundred and twenty seconds); all exhibited a substantial increase in range of motion with no significant differences<sup>2</sup>.

Pain relievers, anti-inflammatory medications, and physiotherapy are all part of the hamstring tightness treatment regimen. We can treat it with a hot pack, stretches, exercises, Post Isometric Relaxation, and Reciprocal Inhibition in physiotherapy<sup>7</sup>.

Karel Lewitt introduced post isometric relaxation technique<sup>8</sup>. To decrease the hyper tonicity and tightness of a shortened muscle, post isometric relaxation technique is used by a therapist. In Post Isometric Relaxation (PIR), submaximal isometric contraction of the same muscle in a group of muscles for a brief period of time is used to decrease the shortened muscle tone. Postural muscles are mostly corrected by this muscle energy technique (PIR). The muscles like hamstring frequently become stiff and tight and can lead to muscular imbalance. This tightness can cause restriction in movement of joints and muscles<sup>9</sup>.

Reciprocal Inhibition techniques is a form of METs in which one muscle's contraction and stretching of the opposite muscle occurs. Muscle energy technique is given this name after the concept of reciprocal inhibition in contrary to post isometric relaxation<sup>10</sup>.

There was a gap in the literature when comparing these two strategies. The aim of the study is to find an effective and acceptable strategy for treating hamstring tightness in patients. This may make it easier for the clinician to grasp these procedures. Objective of this study was to determine effectiveness of Post Isometric Relaxation and Reciprocal Inhibition on Hamstring Muscle flexibility among students of Johar institute of professional studies Lahore.

### Methods:

It was a Quasi-experimental study; the non-Probability Purposive sampling method technique was used in this study. The study was conducted at Johar Institute of Professional Studies Lahore from 1<sup>st</sup> October to March 2020. After the approval form by Johar Institute of Professional Studies and IRB Ref. number is JIPS/DA/2020-70, consent was taken from participants. Total 50 Students were selected by using  $\sigma^2 = \text{variance}$  1.21,  $Z_{1-\alpha} = \text{confidence level } 95\% = 1.96$ ,  $Z_{1-\beta} = \text{power of test } 90\%$ ,  $n = 2\sigma^2 (Z_{1-\alpha} + Z_{1-\beta})^2 / (\mu_0 - \mu_1)^2$ <sup>11</sup>. Inclusion criteria include subjects having bilateral hamstring tightness (Assessed by active knee extension test), Age group 18-25 years, both male and females, students who aren't engaged in any kind of sport training. Patients were excluded if they exhibited, history of knee and hip injury, recent cases of infective arthroplasty at knee or hip joint or any deformity, unilateral hamstring muscle

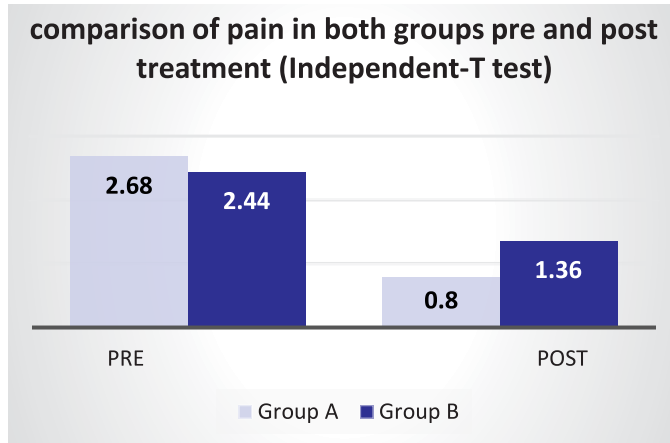
tightness. Informed consent was obtained from participants in written form. Students who fulfilled the inclusion criteria were divided into 02 groups. With an equal number of students in each group, Group A did post isometrics relaxation (PIR) while reciprocal inhibition (RI) was performed by Group B. Active knee extension test was performed before and after intervention. Numeric pain scale, Goniometer, tool was used for data collection tool. The Numeric Pain Rating Scale is used to assess the intensity of pain. As scale reading moves from 0 to 10 its intensity increase from "no pain" to "worst pain". It is a valid and reliable tool for measuring the intensity of pain as compared to the visual analog scale<sup>12</sup>. Goniometer is a scale that is used to measure the range of motion<sup>13</sup>. Total 3 sessions/each week. Treatment consists of 4 weeks. Reading was recorded before and after treatment. Data were analyzed by using SPSS version 21, and 0.05 level of significance was used to calculate the results. Independent sample t test was used to measure the difference between groups. Paired sample t test was used to measure the difference within groups.

**Results:**

Means and standard deviation of ages in both groups revealed that subjects in group A having 21.16±1.14 and group B having 21.72±1.37 mean and standard deviation.in group A 8 were males and 17 were females

**Table 1:** Comparison of Pain in both groups pre and post treatment (independent T-test)

Treatment Group	Mean+ S.D Pre-Treatment	Mean + S.D Post Treatment	p-Value post
Group A (PIR)	2.68±0.47	0.80±0.764	<0.01
Group B (RI)	2.44±0.50	1.36±0.56	<0.01



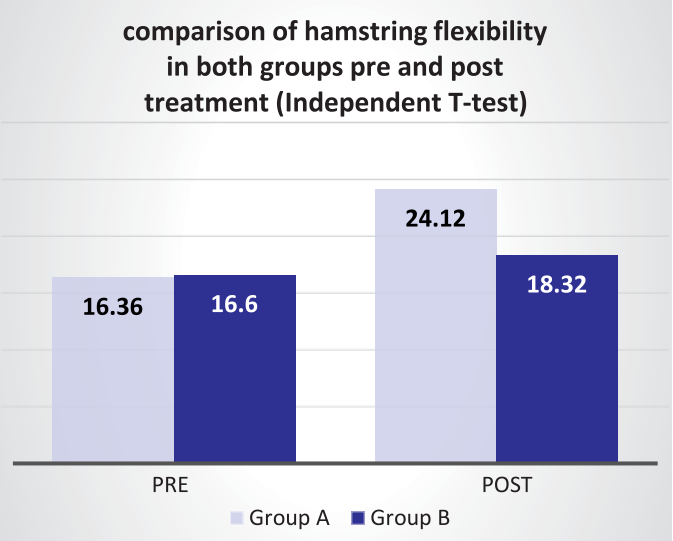
while in group B 6 were males and 19 were females.

Table 1 shows pain intensity in both groups before and after treatment in both groups. As P<0.001 which was less than p=0.05 which shows that the PIR result was more significant statistically and clinically as compared to Reciprocal inhibition, so we reject our null hypothesis and accept our research hypothesis.

Table 2 shows ROM in both groups before and after treatment in both groups. As ROM result revealed that there was a remarkable difference between both groups before and after the treatment. As P<0.001 which was less than p=0.05 which shows that the PIR result was more significant statistically and clinically as compared to RI, so we reject our null hypothesis and accept our research hypothesis.

**Table 2:** Comparison of Hamstring Flexibility in both groups pre and post treatment (independent T-test)

Treatment Group	Mean+ S.D Pre-Treatment	Mean + S.D Post Treatment	p-Value post
Group A (PIR)	16.36±1.11	24.12±1.92	<0.01
Group B (RI)	16.60±0.76	18.32±1.21	<0.01



**Discussion:**

The study was performed to compare the effectiveness of Post isometric relaxation (PIR) versus Reciprocal inhibition (RI) technique on Hamstring Muscle Flexibility among Students of Johar institute of professional studies Lahore. This study was Quasi Experimental trial, in which we compared Post Isometric relaxation and Reciprocal inhibition technique through active knee

extension score. Previously a study was done by Moore et al in 2011 on flexibility of hamstring muscle and Active knee extension test scores were used to measure their data<sup>14</sup>. The results of recent study showed that Post isometric relaxation has greater impact on both side of lower extremity among both gender. Our study results were supported by a study conducted by Agrawal Sonal S in 2016 in 100 young healthy adults aged between 18-25 randomly assigned in to Post isometric relaxation and Reciprocal inhibition groups. Fifty students (twenty five female, twenty five male) in both groups. Range of motion was measured by using goniometer and active knee extension test used to assess knee extension limitation. Result showed greater improvement in flexibility ( $p=0.000$ ) on hamstring muscles with Post isometric relaxation<sup>15</sup>.

Another comparative Experimental study conducted by Sathe, 40 individuals were enrolled in the study and distribute into 2 groups, 20 in each group. Pre and post intervention values are measured with the help of Active knee extension test. Sathe concluded that Post isometric relaxation and Reciprocal Inhibition technique have immediate effect on reducing hamstring muscle tightness, mean Difference is visible that Post isometric relaxation (13.20) is slightly more effective than Reciprocal inhibition (5.45) although statistically significant difference is not seen<sup>16</sup>. Our study result was not supported by M.Nasiri et al. 60 male participants ranging 18-28 years old were enrolled through simple non-probability sampling. Students randomly assigned into 4 groups 15 in each group including static, hold-relax, post isometric relaxation and reciprocal inhibition technique. Treatment carried out for 6 weeks. They conclude that reciprocal inhibition technique has greater impact on knee extension range of motion. Active knee extension ranges showed highly significant ( $p=0.0000$ ) increase from  $157.100\pm 8.2$  to  $168.10\pm 6.7$  after reciprocal inhibition technique<sup>17</sup>.

In another study conducted among young military men, 600 men were examined for hamstring muscle tightness, and hamstring tightness was a very common complaint among this population too. More than half of population showed a reduction in flexibility, and this is in accordance with the findings of the current study<sup>18</sup>. Similarly, Redij et al conducted a study in 2017 to find

out the effectiveness of Post isometric relaxation stretching technique with muscle energy technique on relaxation of tightened iliopsoas muscle. Thirty students were included in this study by convenient sampling. Treatment was given for 3 weeks. Students were enrolled on the basis of inclusion criteria. Participants were randomly assigned into 2 groups. Post isometric relaxation and Muscle energy techniques with equal number of candidate in each group ( $n=15$ ). They conclude that Post isometric relaxation and Muscle energy technique was better as compared to Post isometric relaxation<sup>19</sup>.

### Conclusion:

This study concluded that both post isometric relaxation and reciprocal inhibition were effective in the treatment of tight hamstring, but post isometric relaxation shows much better result.

### Limitation:

Limited sample size, limited clinical area for conduction of study, Limited resources available, students were not willing to continue session due to such shortage of timings and availabilities.

### Recommendation:

It is recommended that further researches should be conducted on large scale, with bulk of students, with more accurate parameters, So, such studies will help those working in clinical setup.

### Ethical Approval: Given

**Conflict of Interest:** The authors declare no conflict of interest.

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