

RESEARCH ARTICLE

"INFLUENCE OF HAMSTRING POSITIONAL RELEASE TECHNIQUE ON LUMBAR LORDOSIS AMONG COLLEGE GOING YOUNG ADULT"

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Manuscript Info

Abstract

Manuscript History Received: 18 February 2025 Final Accepted: 22 March 2025 Published: April 2025 **Background:** The lumbar spine plays a crucial role in maintaining posture and movement. Hamstring tightness is often associated with altered lumbar alignment and increased stress on the spine, contributing to low back pain (LBP). The Positional Release Technique (PRT) is a therapeutic method aimed at improving hamstring flexibility and lumbar posture.

Objective: This study investigates the effect of PRT on hamstring length and its influence on lumbar lordosis angle in young adults (18–25 years old).

Methods: A comparative study was conducted on 100 participants in a physiotherapy OPD. The sample was selected using simple random sampling. Passive knee extension angle and lumbar lordosis angle were measured before and after an 8-day intervention using a flexible ruler and goniometer. Data were analyzed using paired and unpaired t-tests.

Results: A significant increase in hamstring length was observed postintervention (p < 0.0001). The lumbar lordosis angle also improved significantly (p < 0.0001), supporting the effectiveness of PRT.

Conclusion: PRT effectively enhances hamstring flexibility, corrects lumbopelvic alignment, and reduces lumbar stress, making it a valuable technique for musculoskeletal rehabilitation.

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Introduction:-

The human spine is a multisegmental, flexible rod that serves as the central axis of the neck and trunk. Because of the intricate relationship between the musculoskeletal and neurovascular components, the lumbar spine offers a safe and dynamic transition between the thorax and pelvis. Throughout an individual's lifespan, the lumbar area endures several high loads while preserving the range of motion necessary to perform a number of daily duties.¹According to Cynthia C. N., "lumbo-pelvic rhythm" describes a specific example of synchronized lumbar flexion and pelvic anterior tilt in the sagittal plane during trunk flexion and extension. The movement of bending over to touch toes while keeping the knee straight requires lumbagopelvic rhythm.² The lumbar mobility and alignment will change if the pelvis tilts anteriorly on the femoral heads.³The lumbar-sacral junction and the thoraco-lumbar junction are two transitional zones that are situated between the lumbar spine. It is also subject to high functional demands and is prone to bone abnormalities. All of this makes it easier to malfunction.4.Both internal and external factors is effect the

lumbar spine's posture. Intrinsic factors include the lumbar vertebrae (especially L5), the discs between the vertebrae, the pelvic obliquity, the length of both iliolumbar ligaments, the inclined position of the pelvic end plate, and the configuration of the sacrum. The lumbar spine and pelvic muscles are examples of extrinsic elements that can actively or passively alter pelvic tilt through tension.

2. Objectives

- To evaluate how the hamstring positional release technique affects the length of the hamstring muscles in young adults (18–25 years old) who are attending college.
- To examine the change in the lumbar lordosis angle with change in hamstring muscle length in college going young adult in the age group of 18-25

3. Hypothesis

1) 3.1 Null Hypothesis: "Positional release technique will no significant difference to improve the length of hamstrings muscle and will consequently not have any effect on the lumbar lordosis angle."

2) 3.2 Alternative Hypothesis: "Positional release technique will improve the length of hamstrings muscle which consequently will change the lumbar lordosis angle."

4. Materials and Methods

The research was conducted to determine the "effect of hamstring positional release technique on lumbar lordosis in college going young adults". The head of the institution and the institutional ethical committee provided consent and permission to conduct the research.

- Research design:comparative study.
- Research setting:Physiotherapy OPD.
- Target population :males and females in the age group of 18-25 were gathered from nearby institution to provide data.
- Sample size :One hundred people in all were selected for the sample.
- Type of Sampling:Simple random sampling.
- 3) 4.1 Inclusion criteria:
- Gender: Young adult 18-25 years.
- Individuals with self-reported tightness in the hamstring muscle :
- No prior history of musculoskeletal or neurological disorder : To eliminate confounding factors, participants must not have a history of disorder that could affect muscle function, such as previous surgeries, chronic pain, or neuromuscular condition.
 - *4) 4.2 Exclusion criteria:*
- Participants with acute or chronic injuries to the lower limbs :Any recent or long- standing injuries, including sprain, strain, or fractures would exclude participant to avoid worsening their condition.
- Recent history of fracture of lower quadrant.
- Unwillingness to participate in the study.
- Any kind of infection or systemic disorders.
- History of spinal surgery.
- Use of medications or supplements that may affect muscle function or recovery (e.g., corticosteroids, muscle relaxants). Such medication could skew study results, so participants on these treatments are excluded .
- Individuals who have undergone surgery on the thigh .

a. Flexible ruler -



40 cm flexible ruler for measuring the lumbar curve.

b. Half circled, metallic goniometer -



The same physical therapist's knee flexion and extension goniometric tests are highly reliable.

c. Measuring scale -



Used to measure the height of lumber curve (H)

d. Stop watch –



Used for measuring 90 seconds for which position of comfort was maintained.

e. Stabilizing straps -



Used to stabilize both arm of goniometer.

f. Treatment Table –



Used for assessment and treatment of subjects.

g. Marker pen -



Use to mark L-1 and S-2 spinous processes.

- 5) Procedure for hamstring positional release technique: 12
- The individual rests supine with the thigh stretched and slightly abducted off the plinth's edge during the positional release technique process.
- Passively flexing the knee to 40 degrees added a small amount of adduction (varus force) as well as a noticeable internal rotation in the tibia.
- The limbs were then put back to their resting positions after being held in these positions for precisely ninety seconds as well as measured using normal watch time.
- A session of 3 repetitions with the rest period of 10 seconds after every repetition was given for eight days.
- Then measurement of the lumbar lordosis in degrees was taken with the help of flexible ruler before the application
 of positional release technique and on 8th day of treatment.



Fig-3: Positional release technique for hamstrings muscle.

5. Data Analysis

The statistical program STATA version 10.0 was used to analyze the data. The tests used for statistical analysis are - Paired – "t" test:

• To evaluate and contrast how the positional release technique affects knee extension angle at the end of 8th day

from 1st day.

- To analyse mean lumbar lordosis angle between 1st day and 8th day.Unpaired "t" test:
- To compare the change in knee extension angle on the application of positional release technique at the end of 8thday on both sides.
- *6) Continuous Variables of the study:*
- Age.
- Knee extension angle.
- Lumbar lordosis.
 - 7) A p-value of less than 0.05 was deemed statistically significant.

6. Results and Tables

A comparative study was done in physiotherapy OPD on 100 female individuals age between 18 - 25 year, to assess effect of hamstring positional release technique on its length and lumbar lordosis angle.

n = 100

- Following are the observation and results of the study.
- 8) Table 1: Distribution of Research Participants by Age.

| Years of age | Number of subjects |
|--------------|--------------------|
| 19-20 | 8 |
| 21-22 | 23 |
| 23-24 | 39 |
| 24-25 | 30 |
| Total | 100 |
| Mean Age | 23.26±1.67 |
| Range | 19-25 |

9) Graph 1: Maximum Number of Subjects i.e. 39 were in the age Group of 23 to 24.



Table 2: Occupation wise Distribution of College Going Elders.

| Occupation | No. of subjects |
|---------------------------|-----------------|
| Student | 91 |
| Player / Sports + student | 9 |

Table 3: Knee extension angle (right) after the application of hamstring positional release technique.

| Pre intervention (1st day) | Post intervention (8th day) | Difference |
|-------------------------------------|-----------------------------|------------|
| 23.27±7.33 | 19.25 ± 6.49 | 4.02 |
| t-value-19.3349 | | |
| p-value-<0.0001, Highly significant | | |

After the application of hamstring positional release technique knee extension angle on right side was reduce by 4.02 which, at p<0.0001, is statistically significant.

10) Graph 3: Knee Extension Angle



11) Table 4: Knee extension angle (left) after the application of hamstring positional release technique.

| Pre intervention (1st day) | Post intervention (8th day) | Difference |
|-------------------------------|-----------------------------|------------|
| 23.56 ± 7.12 | 19.4 ± 6.33 | 4.16 |
| t-value - 20.1624 | | |
| p-value - <0.0001, Highly sig | <0.0001, Highly significant | |

Statistically highly significant change in knee extension angle (4.16) was noticed on the left side after treatment.



12) Graph 4: Knee Extension Angle

| 13) Table 5: Comparison of change in knee extension angle between right and Left lower ex | tremity: |
|---|----------|
|---|----------|

| | Change in knee extension angle | t-value | P-value |
|-------|--------------------------------|---------|-----------------|
| Right | 4.2 ± 2.08 | 0.4700 | 0.6332, |
| Left | 4.16±2.06 | 0:4790 | Not significant |

Graph 5: Change in Knee extension angle in both side



When knee extension angle on right & left side were compared, results were statistically non-significant. Thus, revealing relatively equal improvement in knee extension angle on both sides.

14) Table 6: Effect of hamstring positional release technique on Lumber lordosis angle.

| Pre interve | ntion (1st day) | Post intervention (8th day) |
|-------------|-------------------------------|-----------------------------|
| 32.15±6.5 | 5 | 35.16 ± 6.46 |
| t value | - 30.2345 | |
| p value | - <0.0001, Highly significant | |

Graph 6: Lumber Lordosis Angle



The mean lumbar lordosis angle was 32.15° which increased to 35.16° after the application of hamstring positional release technique. This change in lumbar lordosis angle was statistically highly significant.

Discussion

Proper alignment is key to controlling mechanical dysfunctions, particularly in the skeletal system. Low back pain (LBP) is often linked to myofascial dysfunctions that alter posture and movement patterns, increasing lumbar stress. Hamstring tightness reduces hip mobility, causing additional strain on the lumbar spine. According to Kaandeepan M. (2011), hamstring lengthening can help reduce this stress. A study on 100 asymptomatic young adults (18-25 years) in a physiotherapy OPD assessed the impact of Positional Release Technique (PRT) on hamstring flexibility and lumbar lordosis. The mean passive knee extension angle improved significantly post-intervention (p < 0.0001), confirming the effectiveness of PRT in increasing hamstring length and improving lumbar alignment. Findings align with studies by Kaandeepan M. (2011) and Nourbakhsh M.R. (2002), emphasizing hamstring flexibility's impact on lumbar posture. Reduced flexibility affects pelvic and spinal alignment, contributing to dysfunction. Overactive hip flexors and weak gluteal muscles force hamstrings to compensate, leading to tightness.

PRT alleviates myofascial restrictions, improves circulation, and reduces muscular hypertonicity, enhancing mobility. By correcting hamstring tightness, PRT effectively restores lumbopelvic alignment, reducing lumbar stress and improving function.

Conclusion

A comparative study was carried out in 100 subjects having moderate to extremely stiff hamstrings to understand how positional release technique affects the length of the hamstring and lumbar lordosis angle among college going females. Current study shows that application of hamstring positional release technique is remarkably substantial as it leads to marked change in all the outcome measures i.e. passive knee extension angle and the angle of lumbar lordosis. Therefore, the information gathered from this comparative analysis lends credence to the idea that the hamstring positional release technique increases the passive knee extension angle along with lumbar lordosis angle by increasing the hamstring muscles length. As this was a one week interventional study, it is unable to document the protocol's long-term effects. Future studies of the same technique should check for the same protocol's long-term effects, as well as see for the effect of the technique when given for longer interventional duration.

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