

Effect of Active Stretching on Quadratus Lumborum Muscle Tightness in Tailors with Non-Specific Low Back Pain

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ABSTRACT

Background: Non-specific low back pain (NSLBP) is a prevalent musculoskeletal disorder, especially among tailors due to prolonged static postures and repetitive trunk movements. The Quadratus Lumborum (QL) muscle plays a key role in spinal stability, and its tightness is commonly associated with low back pain.

Objective: To evaluate the effect of active stretching on QL muscle tightness and lumbar mobility in tailors with NSLBP.

Methodology: Thirty tailors (age 20–45 years) with NSLBP were selected using purposive sampling. Pain intensity and lumbar range of motion (ROM) were assessed using the Numerical Pain Rating Scale (NPRS) and a standard goniometer, respectively. Participants underwent an active QL stretching protocol for one week. Pre- and post-intervention values were compared.

Results: The study showed a significant reduction in pain scores from a mean NPRS of 4.4 to 1.6. Lumbar ROM improved notably, with right side flexion increasing from 28.26° to 32.43° and left side flexion from 24.83° to 29.1°.

Conclusion: Active stretching of the QL muscle is effective in reducing pain and improving lumbar ROM in tailors with NSLBP. This occupation-specific

intervention is a valuable addition to rehabilitation strategies for individuals in prolonged sitting professions.

Keywords: Non-specific low back pain, Quadratus Lumborum Muscle, Musculoskeletal Disorders, Stretching, Tailors, Active stretching.

INTRODUCTION

Tailoring is a livelihood for a substantial sector of the Indian workforce and is performed predominantly in a seated position.¹ During a typical workday, tailors execute monotonous, repetitive shoulder rotations while leaning forward over a sewing machine, a combination that encourages sustained spinal flexion and static loading.² Prolonged sitting, repetitive movements, and poor workstation ergonomics are well-documented contributors to work-related musculoskeletal disorders, with the lumbar spine bearing a considerable share of this cumulative stress.^{1 3} Low-back pain (LBP) is therefore among the most frequent occupational complaints reported by tailors: a recent survey found that approximately 83 % of this population experiences some degree of LBP.² In clinical practice, LBP is broadly categorized as either *specific*—arising from an identifiable pathology such as disc

herniation, fracture, infection, or malignancy—or *non-specific* when no such clear structural lesion can be established.⁴ Non-specific low-back pain (NSLBP) is typically localized between the costal margin and the inferior gluteal folds, often radiating to the contiguous paraspinal regions.⁵

Among the deep lumbar stabilizers, the **quadratus lumborum (QL)** plays a pivotal biomechanical role. Originating from the posterior iliac crest and inserting onto the transverse processes of L1–L5 and the inferior margin of the twelfth rib, the QL contributes to ipsilateral lumbar side-flexion, extension, rib stabilization during inspiration, and the “hip-hiking” motion of pelvic elevation.^{5 6} Sustained contraction is required of the QL during prolonged sitting—as well as during repetitive twisting or bending—rendering it susceptible to overuse, myofascial trigger-point formation, and ensuing muscle tightness.⁴ For tailors in particular, continuous foot-pedaling of traditional sewing machines may accentuate unilateral QL overactivity, creating asymmetrical lumbar loading that further predisposes them to NSLBP

Active stretching is a therapeutic intervention that involves voluntary contraction of antagonist muscles to facilitate lengthening of the targeted tight muscle. It improves flexibility, reduces muscle stiffness, increases joint range of motion, and alleviates pain [6]. However, there is a paucity of research investigating the effect of active stretching specifically on QL tightness among tailors with NSLBP.

Given the biomechanical importance of the QL muscle and the occupational risks associated with tailoring, the present study aims to evaluate the effect of active stretching on quadratus lumborum muscle tightness in tailors with non-specific low back pain, with the broader goal of reducing pain and improving lumbar mobility. The objectives of this study are: to assess the effect of active stretching on reducing pain, to evaluate improvements in lateral flexion

of the lumbar spine using a goniometer, and to determine changes in lumbar extension range of motion following the stretching intervention

MATERIALS & METHODS

This study was designed as an experimental study conducted in Latur city over a duration of three months. A total of 30 participants were recruited using purposive sampling.

The sample size is calculated by using formula:

$$n = 2 \frac{S^2(Z1 + Z2)^2}{(M1 - M2)^2}$$

M1- Mean test intervention

M2- Mean control intervention

S- Pooled SD

Z1- Z value associated with alpha

Z2- Z value associated with beta

which yielded a sample size of 30 participants.

Ref: Pandey E, Kumar N, Das S. Effect of stretching on shortened quadratus lumborum muscle in non-specific low back pain. *Physiother Occup Ther J*. 2018;11(2):80-6.

The study focused on tailors experiencing non-specific low back pain associated with quadratus lumborum muscle tightness.

The materials used during the study included a screening form for participant selection, a pen and writing pad for documentation, and a goniometer to measure lumbar lateral flexion and extension range of motion.

Selection Criteria

Inclusion criteria for participants were as follows: tailors aged 20–45 years of both sexes; those who had been working for a minimum of three months and engaged in sitting-based tailoring work for more than six hours per day; individuals reporting non-specific low back pain with clinically identified quadratus lumborum muscle tightness.

Exclusion criteria included tailors with a recent lower limb fracture, radicular pain,

pain due to any underlying pathological condition, soft tissue injuries, or a history of lower limb fractures with implants.

Intervention

The Quadratus Lumborum (QL) muscle can be effectively stretched in a standing position using a simple yet targeted technique. To begin, the individual should stand upright on a flat surface. For stretching the right QL muscle, the person places the left foot slightly in front of the right foot to create a stable stance. Then, the trunk is laterally flexed to the left side while raising the right arm overhead and reaching it toward the left, creating a gentle elongation along the right side of the lower back. This position facilitates an effective stretch on the right QL muscle. The stretch should be held for 20 to 30 seconds and repeated five times per session. This exercise is to be performed three times daily over a period of five consecutive days to achieve optimal results.

Statistical Analysis

Inferential statistics were used for the statistical analysis of this study in order to assess the impact of active stretching on the tightness of the Quadratus Lumborum (QL) muscles in tailors who suffer from non-specific low back pain. All data were first imported into Microsoft Excel 2021, and each outcome measure's pre- and post-intervention values were compared using a paired sample t-test. The Numerical Pain Rating Scale (NPRS) and lumbar range of motion (ROM) variables were subjected to descriptive statistics, such as mean and standard deviation. Following the one-week stretching regimen, changes in pain levels and range of motion were examined for statistical significance using the paired t-test.

RESULT

The study's findings showed that after a week of active stretching exercises that targeted the Quadratus Lumborum (QL) muscle, tailors with non-specific low back pain had a significant improvement in both pain reduction and lumbar range of motion.

Table 1- Depicts the frequency and percentage of frequency distribution of Age.

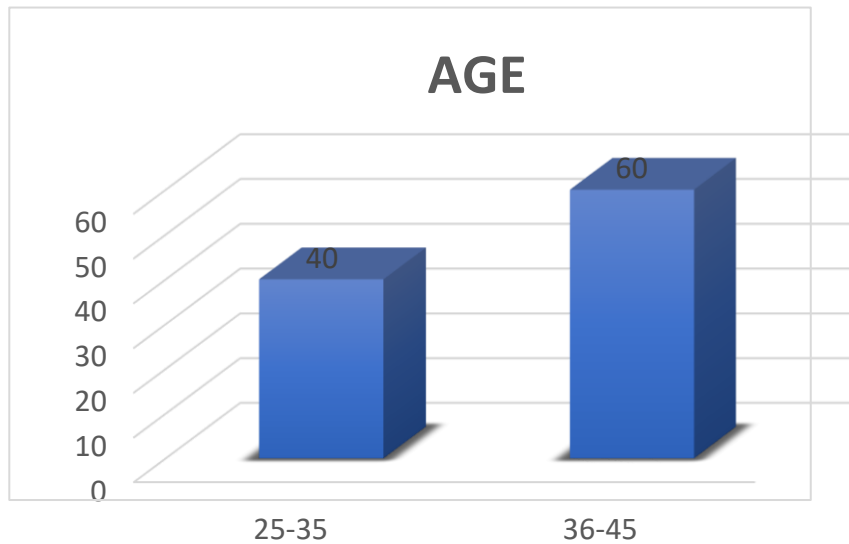
Age	Frequency	Percent
25-35	12	40
36-45	18	60
Total	30	100

Table 2 -Depicts frequency and percentage distribution of Gender

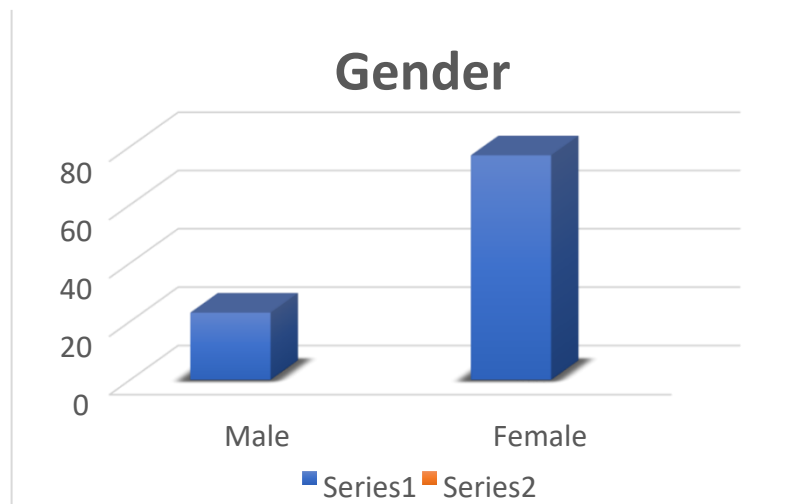
Gender	Frequency	Percent
Male	7	23
Female	23	77
Total	30	100

Table 3- Depicts percentage distribution of duration of work

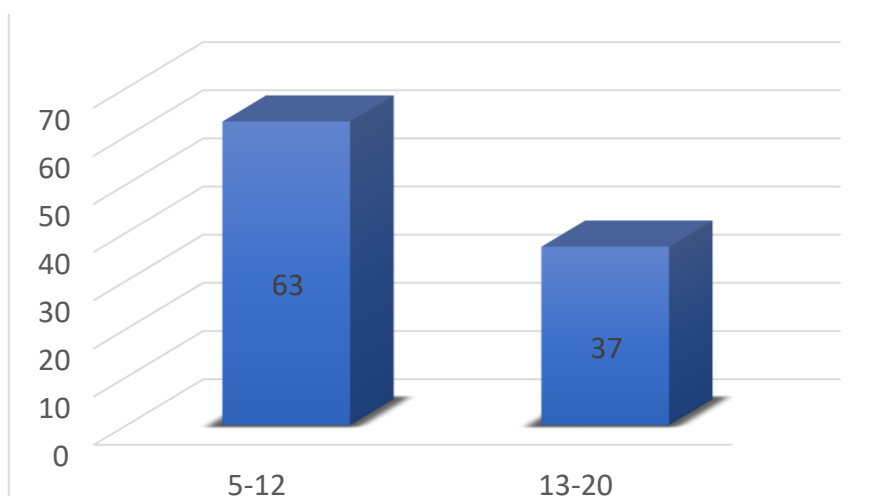
Duration of work (years)	Percentage
5-12	63
13-20	37



Graph 1- It shows the percentage distribution of age Between 25-35 with 40%, age between 36-45 with 60% respectively.



Graph 2 – It shows that frequency distribution with gender group, 77% were females and 23% were males.



Graph 3- It shows the percentage distribution of duration of work between 5-12 (63%) and 13-20(37%).

Table 4- Pre and Post Mean and SD of NPRS.

NPRS	Mean	SD	P value	t value	Inference
PRE	4.4	1	1.52E-21	2.0484071	
POST	1.6	0.85			

Table 5- Pre and Post Mean and SD of spinal flexion right

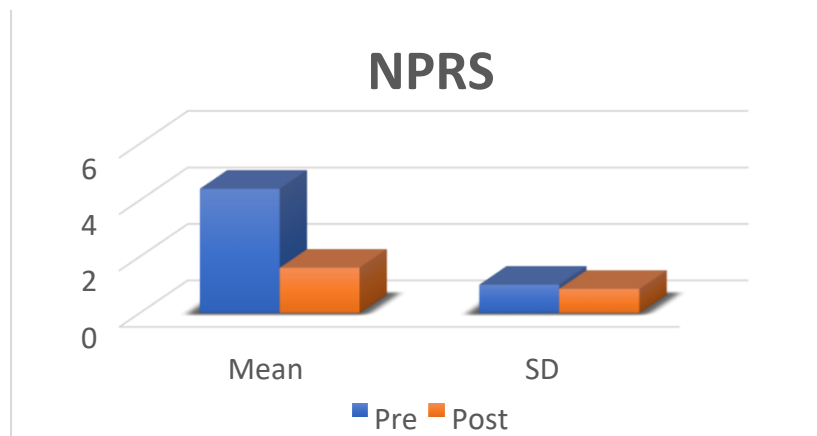
Spinal Flexion Right	Mean	SD	P value	T value	Inference
PRE	28.26	2.59	8.24E-20	2.048407	
POST	32.43	2.47			

Table 6- Pre and Post Mean and SD of lateral flexion left.

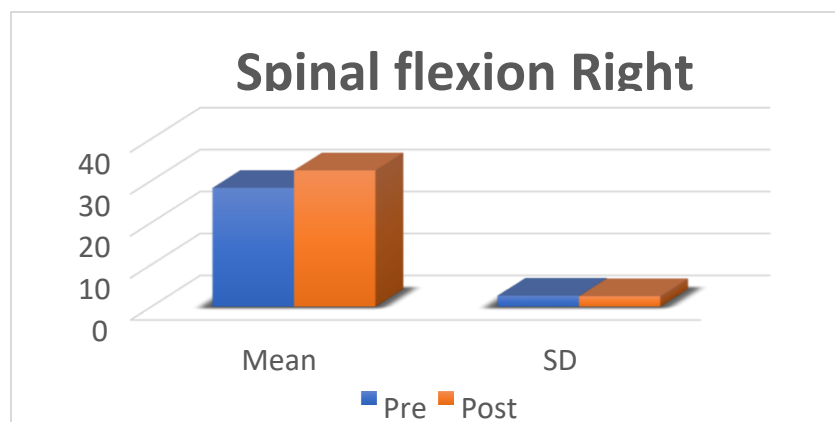
Spinal Flexion Left	Mean	SD	P value	T value	Inference
PRE	24.83	3.24	2.749E-16	2.0484071	
POST	29.1	3.13			

Table 7- Pre and Post Mean and SD of spinal extension.

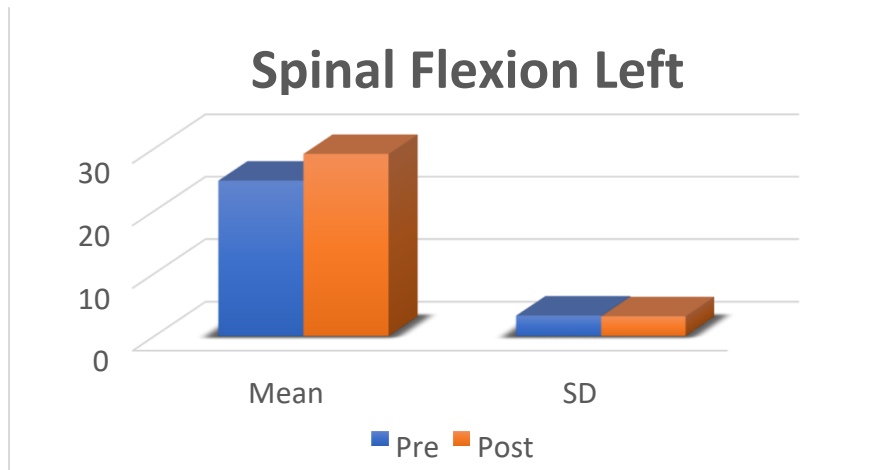
Spinal Extension	Mean	SD	P value	T value	Inference
PRE	33.76	3.79	6.49E-16	2.048407	
POST	39.76	3.2			



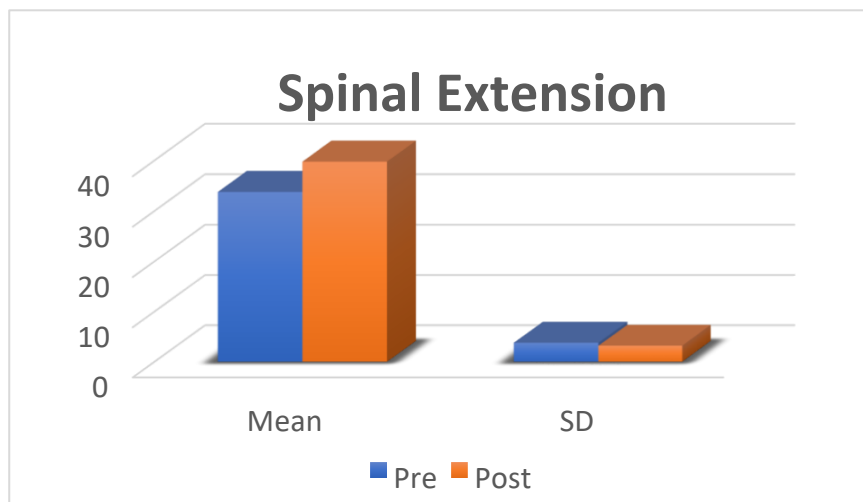
Graph 4- Pre and Post Mean and SD of NPRS



Graph 5 - Pre and Post Mean and SD of spinal flexion right.



Graph 6- Pre and Post Mean and SD of lateral flexion left.



Graph 7- Pre and Post Mean and SD of spinal extension

DISCUSSION

The current study showed that in tailors with non-specific low back pain (NSLBP), active stretching of the Quadratus Lumborum (QL) muscle significantly improves lumbar range of motion (ROM) and lowers discomfort. These findings are consistent with earlier research that highlighted the benefits of muscle stretching for reducing musculoskeletal pain.

According to Pandey et al. (2018), people with NSLBP experienced much less discomfort when they performed stretching activities that targeted the shortened QL muscle. Their results corroborate the current study by indicating that stretching increases muscle length and flexibility and that QL

muscle stiffness contributes to pain and limited movement.

Similarly, Bhosale et al. (2023) found that physical stretching was a useful addition to therapy regimens for lowering NSLBP in people who spend a lot of time sitting down. Because their work is so static, tailors are particularly vulnerable to these postural stresses, hence occupation-specific therapies are very beneficial.

Varshney et al. (2022) provide additional support for this claim by contrasting passive stretching of the QL muscle with stretching of the Latissimus dorsi. Targeting muscle-specific imbalances in the lower back region is crucial, as they found that QL stretching significantly reduced pain and impairment.

The present study's improved lumbar range of motion is also in line with research by Jagga et al. (2024), who found that static stretching improves lumbar spine mobility in addition to reducing chronic low back pain. Stretching is thought to improve neuromuscular control, decrease muscle stiffness, and increase muscle fibre extensibility, all of which contribute to more functional movement.

Bivalkar et al. (2018) further highlighted that active manual stretching of a tight QL muscle improved range of motion more than stretching a weak QL muscle. This lends credence to the notion that improving tightness in particular leads to improved biomechanical results.

Overall, this study's results support the therapeutic benefits of active stretching for NSLBP management, especially for high-risk occupational groups like tailors. By improving blood flow and neuromuscular coordination, active stretching not only relieves tense muscles but also speeds up tissue healing.

CONCLUSION

In tailors with non-specific low back pain, this study demonstrates that active stretching of the QL muscle is a successful, non-invasive treatment for lowering pain and increasing lumbar range of motion. To address musculoskeletal problems related to the workplace, occupational therapy programs ought to think about incorporating such focused stretching techniques.

Declaration by Authors

Ethical Approval: The Approval for the study was obtained from the Ethical Committee.

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

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