A J Journal of Medical Sciences

AJ Journal of Medical Sciences

CASE REPORT

The Effect of Dynamic Stretching in Low Back Pain with Hamstring Tightness in A 22-Year-Old Gym Person – A Case Study

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ARTICLE INFO

Article history:
Received 16-10-2025
Accepted 23-12-2025
Published 30-12-2025

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https://doi.org/10.71325/ajjms.v2i4.25.70

ABSTRACT

Low back pain (LBP) is a prevalent condition characterized by soreness in the lower back, buttocks, and upper thighs, disturbing a considerable portion of the global population. The effect of dynamic stretching on low back pain with hamstring tightness in gym person of 22-year-old is being tested in this study. A 22-year-old male patient who is a case of low back pain with hamstring tightness underwent pre-intervention assessment of ROM (Range of motion) with a universal goniometer. NPRS (Numerical Pain Rating Scale) was recorded, and the toe touch test was examined. Then dynamic stretching intervention was given for 8 weeks of duration, five times a week, and then post-intervention assessment of ROM with universal goniometer, NPRS and toe touch test were recorded. It showed a significant improvement in the extension range of the right knee (from 115° to 124°) and left knee (from 115° to 125°). NPRS showed improvement from moderate (6) to mild (2), and in the toe touch, it progressed from 11 inches to 4 inches. Hence, dynamic stretching is effective in improving hamstring flexibility and relieving low back pain in gym-going individuals.

Keywords: Low back pain, undergraduate students, Numerical Pain Rate Scale, knee range of motion, Dynamic stretching technique

INTRODUCTION

Low back pain (LBP) is a prevalent condition characterized by discomfort in the lower back, buttocks, and upper thighs, affecting a substantial portion of the global population[1]. Given its widespread impact, low back pain is considered a major problem in public health issue globally[2]. Hamstring tightness can lead to posterior pelvic tilt and reduce the lumbar lordosis, contributing to low back pain. Additionally, limited hamstring flexibility impairs pelvic mobility, resulting in altered spinal biomechanics and increased risk of spinal disorders[3]. Musculoskeletal disorders and low back pain can result from various factors, such as overuse, poor posture, biomechanical stresses, and intense physical or mental demands. Limited hamstring flexibility can disrupt spinal alignments, particularly in seated positions, leading to increased flexion and strain on the lower back, ultimately contribute to pain. Other contributing factors to low back pain include weakened abdominal muscles, poor posture, and poor back endurance[4].

Prolonged strain on shortened low back pain muscles can lead to rapid fatigue and weakening. This reduces endurance in the back extensor muscle, which may overburden soft tissue and spinal structures, potentially causing musculoskeletal issues, with LBP being a prevalent outcome[5]. They are semitendinosus, semimembranosus and biceps femoris long and short heads[6].

Mechanical discomfort usually arises from bad behaviors when the muscles of the lower spine and the hamstrings contract, such as poor posture, incorrectly constructed chairs, and improper bending and lifting movements[7]. During repeated lifting (Fig. 1), individuals with low back pain initially employed a squatting lifting technique, characterized by greater knee flexion, a more upright thorax and pelvis, and slower movement velocities. The LBP also exhibited greater peak knee power and reduced peak lumbar shear forces. As the task progressed, the technique shifted towards a more stooped posture, resulting in fewer differences between groups by the end of the task[8].

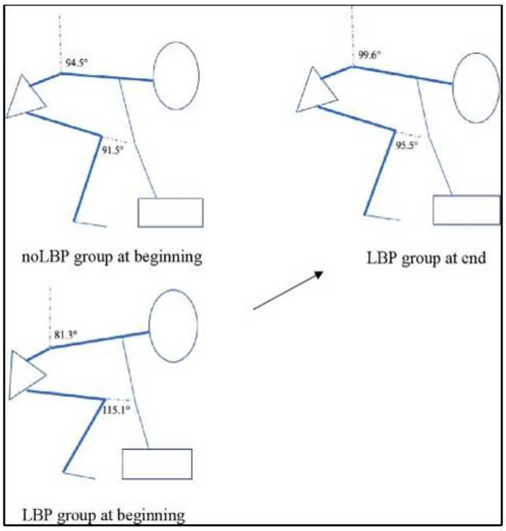

Fig. 1: Patterns of lifting

Repetitive lifting over extended periods can harm musculoskeletal health. This daily occupational task requires coordinated movements of the trunk, hips, and knees. Safe lifting depends on factors like movement speed, foot positioning, physical attributes (e.g., hamstring flexibility), and proper lifting technique[9]. LBP is a common musculoskeletal problem globally. This study presents, compares and contextualizes the global prevalence and years lived with disability (YLDs) of LBP with age, sex and region, from 1990 to 2017. It affects more than 50% of the general population. It is estimated that over 70% of adults have at least one episode of low back pain during their lifetime. The risk factors like age, occupation, body distribution and life habits[10]. The aim of the present study is to analyze the effect of dynamic stretching on low back pain with hamstring tightness in a 22-year-old gym person.

MATERIALS AND METHODS

The participant was taken from a college in Mangalore. Initially, informed consent was obtained from the participant, and he was explained the test procedure. Recruitment was done according to the inclusion and exclusion criteria. Examination was conducted: Knee range of motion, Numerical pain rate scale, and Toe touch test. The required materials were: measuring tape, universal half goniometer, a couch and a chair. Inclusion criterion was that the participant must be a gym person with low back pain and hamstring tightness. Exclusion criteria were the individuals with intravertebral disc prolapse (IVDP), spondylosis, spondylolisthesis. Here outcome measures are- Knee ROM: Universal half goniometer, Hamstring flexibility: Toe touch test, Pain: Numeric pain rate scale. Knee ROM: Universal half goniometer (Table. 1).

Table 1

Fulcrum	Proximal arm	Distal arm
Over the epicondyle of the femur	Midline of the femur. This line extended from the greater trochanter down through the lateral epicondyle.	Midline of the fibula. This line runs from the head of the fibula and the lateral malleolus.

Starting position

The patient should sit on a table, with the hip flexed to 90 degrees. The contralateral leg should remain straight on the table. The therapist should stand beside the patient (Fig. 2).

Fig. 2: Starting position

Ending position

Knee extension range of motion, the examiner uses one hand to maintain the knee extension and to align the distal arm over the lateral epicondyle of the femur [11] (Fig. 3).

Fig. 3: Ending position

Hamstring flexibility

Toe touch test: Subject stands erect, bare-footed, and with feet slightly apart. The subject then bends at the waist to lean slowly forward to attempt to touch the ground with their fingertips, the hand flat with the finger outstretched. Bouncing and jerking are not allowed. The examiner holds a ruler on the ground, with the zero mark at the ground level. Knees must be kept straight (the examiner may need to hold them to prevent any bending).

Scoring: Measure the distance from the fingertips to the ground (Fig. 4). The distance between the end of the finger and the ground is measured with the ruler [12] (Fig. 5).

Fig. 4: Starting position

Fig. 5: Ending Position

Numeric pain rate scale (NPRS)

Is a segmented numeric version of the visual analog scale (VAS) in which a respondent selects a whole number (0 – 10 integers) that best reflects the intensity of his pain [13] (Fig. 6).

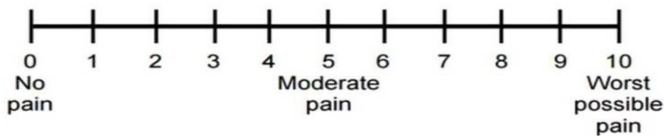

Fig. 6: Numerical pain rate scale

Dynamic hamstring stretching

This exercise was done in two positions:

1. **Supine:** The affected leg was positioned at 90° hip and knee flexion (Fig. 7). A towel supported the distal thigh while the quadriceps contracted to extend the knee (Fig. 8).

2. **Standing:** The exercise involved hip flexion with the knee straight (Fig. 9). The dynamic stretch consisted of 3 sets of 15 reps, holding each for 1 second [14].

Fig. 7: Dynamic stretching of hamstring

Fig. 9: Dynamic stretching of hamstring in standing

Fig. 8: Dynamic stretching of hamstring using towel

RESULTS

The patient reported an overall improvement in NPRS scores. The patient underwent physiotherapy sessions for 2 consecutive months, and there was indeed a good prognosis, with reductions in pain and improvements in flexibility (Table. 2).

NPRS: The patient's pain score was improved from moderate (6/10) to Nil (0/10).

Toe touch test: Pre-intervention measurements showed that the distance between the fingertip and the ground was 11 inches; post-intervention, it decreased to 4 inches.

Table 2

Test	Pre- intervention				Post- intervention			
NPRS	**6/10**				**0/10**			
Toe touch test	**11 inches**				**4 inches**			
ROM	**Knee extension**				**Knee extension**			
	Right		**Left**		**Right**		**Left**	
	Active	Passive	Active	Passive	Active	Passive	Active	Passive
	0-115^{0}	0-118^{0}	0-115^{0}	0-118^{0}	0-124^{0}	0-128^{0}	0-125^{0}	0-128^{0}

DISCUSSION

The study aimed to determine the effect of dynamic stretching (DS) on low back pain (LBP) with hamstring tightness in a 22-year-old gym person. Previous studies by Gou *et al.*,[15] and Shinde *et al.*,[16] concluded that dynamic stretching of the hamstrings reduces LBP. However, Malwanage *et al.*,[17] found that dynamic stretching not only improves hamstring flexibility but also reduces low back pain.

CONCLUSION

The present study establishes that dynamic stretching is effective in improving hamstring flexibility and relieving LBP in gym-going individuals, with the intervention lasting for 8 weeks. However, further investigation is required to confirm the results.

DISCLOSURE

Funding:

None.

Conflict of interest:

The authors declare that there is no conflict of interest among authors.

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