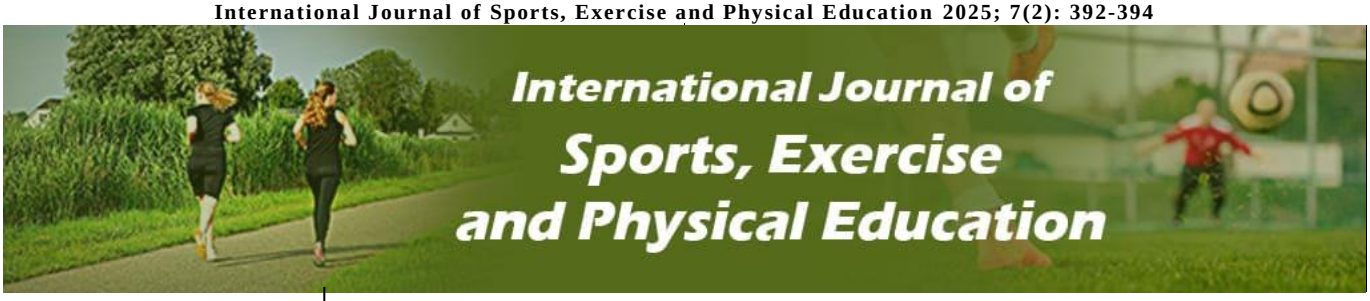

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Effectiveness of dynamic neuromuscular stabilization exercises versus passive stretching for hamstring tightness in college students

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Abstract
Hamstring tightness is common among college students due to prolonged sitting, poor posture, and lack of physical activity. Two widely used interventions to address this issue are Dynamic Neuromuscular Stabilization (DNS) and passive stretching. DNS focuses on restoring proper movement patterns through the activation of deep stabilizing muscles, while passive stretching aims to improve flexibility by elongating muscles. This study involved thirty students aged 19 to 22, randomly assigned to two groups. Group A performed DNS exercises, and Group B engaged in passive stretching for four weeks. Pre- and post-intervention assessments were conducted using the Active Knee Extension (AKE) test and the Activities of Daily Living (ADL) scale. Both groups showed significant improvement; however, Group A demonstrated greater gains in AKE and ADL scores. These findings suggest that DNS may be more effective than passive stretching in reducing hamstring tightness and enhancing functional performance in college students.

Keywords: Dynamic Neuromuscular Stabilization, Passive stretching, Active knee extension test, Activities of daily living scale

Introduction
The hamstrings tightness refers to a condition where the hamstrings muscles become overly contracted and inflexible, leading to reduced range of motion, stiffness, and pain in the back of the thigh, this tension can also radiate to the calves, Glutes, and lower back. This tightness can result from prolonged sitting, insufficient stretching, overuse, or injury. Athlete and individuals with sedentary lifestyles are particularly prone to this issue. Tight hamstrings may limit the range of motion, making activities like running, bending, or stretching challenging. If left unaddressed, it can increase the risk of strains or lower back pain.
Dynamic Neuromuscular Stabilization (DNS) is a rehabilitation and performance training approach that emphasizes the role of the nervous system in regulating movement and stability. Developed by Czech physiotherapist Pavel Kolar, DNS is rooted in developmental kinesiology, which studies how infants develop movement patterns and motor control. DNS focuses on restoring proper posture and movement mechanics by re-educating the nervous system. It highlights the importance of core stability, optimal joint alignment, and effective muscle activation. The approach emphasizes the interplay between the body's segments, ensuring that movements are coordinated and efficient.
Passive stretching is a flexibility technique where an external force, such as a partner, therapist, or gravity, helps lengthen the muscles and improve range of motion without active muscle contraction. This method is often used in rehabilitation and athletic training to enhance flexibility and relieve muscle tightness. During passive stretching, the individual typically relaxes while the external force moves their body into a stretched position. Common examples include using a strap or having a partner assist in holding a stretch. This approach can be particularly effective for targeting specific muscle groups, such as the hamstrings or hip flexors.

Methods and Methodology
Materials Used: The following tools and instruments were utilized for intervention and assessment: pen, paper, writing pad, pillow.

Study design and setting: The study was conducted in two groups as experimental study design. The study was carried out in College of Physiotherapy, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore under the supervision of senior physiotherapist, college of Physiotherapy, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore.

Participants and sampling: A total of 30 College students aged 19–22 years were selected using a convenient sampling method. Subjects were randomly divided into two groups:

- **Group A:** Dynamic Neuromuscular Stabilization Exercise
- **Group B:** Passive stretching

Inclusion Criteria

- Males of age group (19-22).
- Pain in the back of the thighs.
- Positive active knee extension test.

Exclusion Criteria

- Chronic hamstring injuries.
- Sciatica.
- Lower Limb fractures.
- Herniated discs.
- Multiple sclerosis
- Rheumatoid arthritis.
- Age group above 22 years.

Variables
Dependent Variables
Hamstrings tightness

Independent Variables
Dynamic neuromuscular stabilization exercise, Passive stretching

Outcome Measures

- Active knee extension test
- Activities of daily living

Treatment Procedure: The subjects were treated on alternative days for 20 minute per sessions, once a day both groups received treatment for 4 weeks. The pretest was taken at the beginning of the treatment and post-test is taken at the fourth week of treatment period. A written consent form was signed by the patients in order to get permission for the treatment, 30 students were separated into two groups such as Group A Group B with 15 students in each group. Evaluation of students was done by Active knee extension test in both groups. Group A received Dynamic Neuromuscular Stabilization Exercise Group B received Passive Stretching for students with Hamstrings Tightness.

Intervention
Group A: Dynamic Neuromuscular Stabilization Exercise
Group B: Passive Stretching of Hamstrings

Table 1: Intervention protocol for DNS and passive stretching in college students with hamstring tightness

Position	Repetition
Side sitting position	5sec hold *10rep
Supine with foot grip	5sec hold *10rep
Crawling	5sec hold *10rep

The student should lie on the back and therapist lifts the leg straight, until a stretch is felt on the back of the thigh. The stretch is held for 30-60 seconds.

Result
When analyzing these results it is found that after 4 weeks group A shows significant improvement in reducing tightness in Hamstrings. This study shows that after following the procedure of Dynamic Neuromuscular Stabilization exercise for 4 weeks of duration the post intervention mean values of pain intensity shows some significant difference both groups.

Comparison of Results

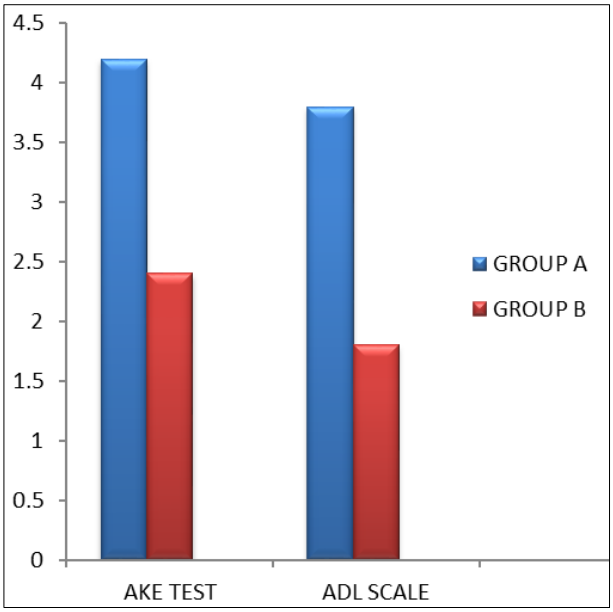

Fig 1: Comparison of pre- and post-intervention outcomes between DNS and passive stretching groups

Discussion
The study was aimed to evaluate the effects of DNS Exercise and passive stretching for Hamstrings tightness to show improvement in active knee extension test and ADL scale for this study 30 students were taken. From this sample of 30 the subject were divided into two groups consisting of 15 each. The outcome measure was done by Active knee extension test and ADL scale. It is widely used and yields scores that are reliable valid. The group A conducted DNS exercise for 20 minutes for 2 weeks. The group B conducted passive stretching for 2 weeks. Both group were assured on first and last day of treatment. On statistical analysis using independent t test it was found that there is significant difference in the post test scores of group A over the group B in Hamstrings tightness, thus resulting null hypothesis. The result showed that DNS EXERCISE are more effective than passive stretching there by supporting the alternative hypothesis.

Conclusion
The conclusion of this study is based on the post mean measure of Active knee extension test and ADL Scale of both group A and group B and concluded that there is a significant improving in active knee extension test and activities of daily living in group A in comparison with the students in group B. As per data analysis and interpretation,

null hypothesis rejected and the alternate hypothesis is accepted which states that there is significant improvement on Dynamic Neuromuscular stabilization exercise (group A) than passive stretching (group B) in the treatment of Hamstrings tightness.

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