Comparison of Neurodynamic Sliding Versus Bowen Technique for Hamstring Tightness Among College Students Using Kemtai (AI)

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Abstract. One common musculoskeletal problem is tight hamstrings, which can reduce flexibility, raise the risk of injury, and impair performance in general. College students are particularly prone to hamstring tightness, especially if they lead sedentary lifestyles or participate in sports. Static stretching has historically served as the foundation of hamstring lengthening regimens. An innovative tool for clinical practice and functional assessment is the KEMTAI software system, which tracks and analyses human movement using a camera. The objective of this study was to evaluate neurodynamic sliding and Bowen technique for hamstring tightness among college students using KEMTAI software and VISA-H Questionaries. The study will be carried out at Saveetha medical college and hospital. Based on the inclusion and exclusion criteria, 40 people in total will be chosen for the study. the researcher will give the subjects an explanation of the study before starting. Following a pre-assessment the participants will be divided into groups at random using the lottery method. Experimental group will receive neurodynamic sliding and conventional group will receive Bowen technique for hamstring, given for 4 weeks, 3 sessions per week and 30 minutes to 40minutes per session. The pre- and post- assessment will be done using KEMTAI software and VISA-H Questionaries. It discovered that experimental group is more effective than the control group on the hamstring tightness among college students. Based on the statistical data analysis. The study found that for college students with hamstring tightness, neurodynamic sliding is more beneficial than the Bowen approach.

Keywords: Hamstring tightness, Neurodynamic sliding, Bowen technique.

1 Introduction

The hamstring muscles exit the posterior femur and pelvic ischial tuberosity and enter the proximal lateral tibia. One of the joint's two muscles is this one. The hamstring muscles function as weak extensors of the hip and powerful flexors of the knee [1]. The hamstring muscle is a known potential factor that could explain how the pelvis, lower extremities, and lumbar spine cooperate. To move the hip and knee joints, the three long muscles that run from medial to lateral are the semimembranosus, semitendinosus, and biceps femoris. These muscles make up the hamstring muscle. One muscle that affects several joints and is commonly injured by tension is the hamstring muscle [2].

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The hamstring's range of motion is crucial for the body's biomechanics. The hamstring muscles have a favorable tendency to shorten due to their multi-joint nature, and this can cause discomfort pelvic biomechanics and lumber. Muscle imbalance and imbalance can result from biomechanical disturbances of low back pain, an increase in nerve tension, and abnormal lumbopelvic rhythm. Limited adaptability impacts the effectiveness and caliber of fundamental motions [3]. The hamstring muscles are linked to low back discomfort, abnormal gait, and movement disorders in the lumbar spine and pelvis. Tight hamstrings, which limit flexibility, can cause neuromusculoskeletal symptoms, leading to reduced strength, stability, endurance, and other related factors [4]. The musculoskeletal system is harmed by overuse as a result of the loss in edibleness. Neuro-musculoskeletal symptoms, including a decline in strength, stability, endurance, and other areas, have been brought on by the decline in edibility. Reduced range of motion at the afflicted joint results from stress in the muscles caused by less muscular distortion. Following eccentric activities, hamstring injury and symptoms of muscle damage are associated with an increased risk of patella tendinopathy, patellofemoral discomfort, and hamstring exibility [5]. A sedentary lifestyle contributes to diminished hamstring flexibility because it causes adaptive shortening of the muscles, tendons, and fascia, which is sustained for a longer period of time at certain angle of contraction, such as in extended sitting posture [6]. The primary muscle that affects pelvic posture is hamstring flexibility. By trying to regulate anterior pelvic tilt and trunk forward bending during active posture, it aids in pelvic stabilization in the sagittal plane. Tight hamstring muscles during spine flexion may limit anterior pelvic tilt because bending forward is one of the most prevalent motions in daily life. This can exacerbate lumbar muscle and ligamentous tension, leading to noticeably higher compressive pressures on the lumbar spine.[7] Two such strategies that are becoming popular are neurodynamic sliding, the neurodynamic sliding technique and Bowen technique. Such feelings are modified by variations in neurodynamics, or the movement of the neural system. Neurodynamics is the synthesis of the morphology, biomechanics, and physiology of the neural system. A person with low hamstring extensibility may have limited range when doing the passive straight leg raise test (SLR) because to aberrant neurodynamic affecting the sciatic, tibial, and common fibular nerves.[8] The neurodynamic shift in the nerve system's mobility can be changed by stretching and moving, which may change these sensations. NDST interventions to decrease neural mechanosensitive, this intervention could be beneficial in the hamstring flexibility. [9] A method used on the body's delicate connective tissue is called Bowen treatment. This method uses quick, gentle rolling motions over the tendons, ligaments, and muscles of the hands and thumb. The muscle's edge is progressively compressed until resistance is encountered. This strains the muscle, and causes it to shift from its optimum position. Then, the medial site is gently compressed, and the assembly is gently rolled [10]. KEMTAI software system is a tool for clinical practice and functional evaluation that uses a camera to track and analyze human movement. By reference of these landmarks and tracing bodily movements, this system quantifies and tracks motion of the body’s joints, as well as determines and evaluates the body’s orientation and provides each person with accurate feedback based on what is being done and what motion forms should be altered during the action in real time, while the VISA-H is a self-report clinical outcome tool found to be useful in individuals with Proximal Hamstring Tendinopathy. Hamstring syndrome can be addressed, and it has eight questions that span pain, daily life activities, and sports participation. The purpose of this study was to assess neurodynamic sliding and Bowen technique for hamstring tightness and its impact on flexibility, which leads to physical trauma or injury of some sort to musculoskeletal structures, low back pain included. It introduces neurodynamic sliding

and the Bowen technique as interventions to improve hamstring flexibility. The study aims to evaluate these techniques using the KEMTAI software system and the VISA-H Questionnaire among college students.[11]

2 Method

There will be 40 participants in the study who fulfil certain inclusion and exclusion requirements, and it will be conducted at Saveetha medical college and hospital. The researcher will ensure that the participants understand the study's goal and procedures before it starts, and they will sign an informed consent formattesting to their agreement to participate. An initial pre-assessment will be administered to participants to establish baseline measurements. Following this, individuals will be drawn at random via a lottery to be placed in one of two groups. The Experimental Group will be given a combination of neurodynamic sliding exercises. Control Group will receive the Bowen technique. These interventions will be administered over a 4-week period, with each group attending three sessions per week. Each session will last between 30 to 40 minutes. Throughout the study, participants will be assessed both before and after to measure joint range of motion using KEMTAI and the VISA-H Questionnaire to evaluate the impact and severity of hamstring injuries. These instruments will assist in assessing how well the therapies work to increase hamstring flexibility and decrease tightness.

2.1 Inclusion Criteria: Those between the ages of 18 and 21, Both sexes included and Presences of hamstring tightness defined by straight leg raise < 70 degrees.

2.2 Exclusion Criteria: Individuals who have experienced hamstring injuries during the past six months or who have recently undergone hamstring surgery, any neurological disorders affecting lower limb function and Any sports activity involved students.

2.3. Outcomes measures:

Primary outcome: ROM using KEMTAI

Secondary outcome: VISA-H

3 Procedure

Following that, a lottery technique will be used to randomly split them into two groups. The experimental group will be given a combination of hamstring stretching and neurodynamic sliding activities and control group will receive combination of hamstring stretching and Bowen techniques.

3.1 Experimental group:

Depending on patient allocation, the patient began the treatment program the following day after completing the baseline evaluation. The neurodynamic sliding exercises are designed to improve nerve mobility and reduce muscle tightness, which can enhance hamstring flexibility. The participant will lie on their back on a flat surface, such as a treatment table, with both legs extended. The participant will perform a straight leg raise (SLR) on the affected leg. The leg is lifted while keeping the knee straight. Once the leg is raised to the point of tension, the participant will gently flex (point the toes toward the head) and extend (point the toes away from the head) the ankle. After that, the movement is repeated with the leg lowered back to its initial position. Three sets of ten repetitions are performed. Rest period of 30 seconds between the sets. As the participant gets used to the exercise you can slide the nerve and increase the range of motion but not so not to overstretch the nerve 3 times a week. Each session will be 30 to 40 minutes long the exercises will take place under the supervision of a qualified therapist.

3.2 Control group:

In order to promote the body's healing processes, ease tense muscles and increase flexibility the Bowen technique is a mild, non – invasive therapy that involves rolling motions over muscles, tendons, and other soft tissues. Depending on the area being treated the subject will recline comfortably on a treatment table with their face up or down. First, the therapist will perform a series of mild rolling motions on certain hamstring and surrounding soft tissues, muscles and tendons. The therapist applies gentle pressure with their fingertips or thumbs to make the movements. In order to target important locations along the muscle groups, the therapist will execute these movements in precise sequences. To give the body time to react to the treatment, the therapist will take a brief break after a series of movements. For the body's neurological system to incorporate the changes, this rest period is essential. Depending on the participants condition, more regions may be targeted or the process will be done on the opposite leg if necessary. There will be three sessions per week, with each lasting between thirty and forty minutes. Each session will be conducted by therapist, who will ensure that the technique is applied correctly and adjusted to the participant's needs. Fig. 1 shows Post test values of control and experimental group

4 Statistical analysis

The information collected was tallied and analyzed. Mean and SD (SD) were determined for each parameter. Significant differences between pre- and post-test scores were determined using a paired t-test. An unpaired t-test was conducted to find significant differences between the two groups. A P-value of less than 0.001 was considered statistically significant. Table 1 shows Comparing clinical outcomes post-test values between groups

Table 1. Comparing clinical outcomes post-test values between groups

Parameters	Control group	Experimental group	T-Value	P-Value
VISA-H	22.50	27.65	8.93	<0.0001
ROM using KEMTAI	134.45	125.25	7.22	<0.0001

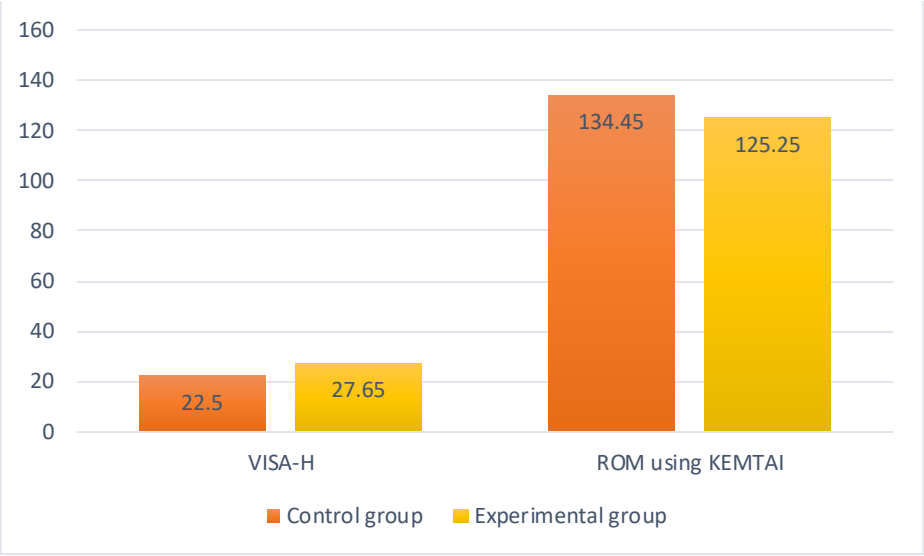

Fig. 1. Post test values of control and experimental group

5 Result

The statistical examination of the quantitative data showed that the values in both groups had changed in a way that was statistically significant. Table 1 displays the When the post-test results of the Control and Experimental groups were compared, the Experimental group scored 22.50 while the Control group scored 67.45. The results are therefore extremely statistically significant, as indicated by the P-value of less than 0.0001.

Thus, the study shows that neurodynamic sliding is more effective than Bowen technique for hamstring tightness among college students.

6 Discussion

Preventing injuries to the lower extremities requires maintaining hamstring flexibility (Malliaropoulose et al., 2004). Numerous factors, including age, gender, race, tissue temperature, strength training, stiffness, bad posture, and a short warm-up before exercise, can affect this flexibility (Fasen et al., 2009).

The best way to increase range of motion in the passive knee extension and hamstring muscles appears to be neurodynamic therapy, which is superior than stretching.

Despite the fact that neural mobilisation might be a helpful way to increase hamstring flexibility, it should be used cautiously because to the heterogeneity of the articles. Not with standing these reservations, the review and meta-analysis offer encouraging findings and practical information for application (Laura López López et al., 2019).

According to this study, neurodynamic sliders might have a bigger impact on hamstring flexibility over time than traditional static stretching. Additionally, this effect seemed to be more permanent—lasting for four weeks. Since flexibility of the entire posterior thigh unit is essential in sports involving high volumes of high-speed running, this technique is probably more appropriate for maintaining and restoring functional hamstring flexibility in the prevention and rehabilitation of hamstring strain injuries (PhD Roel De Ridder et al., 2019).

These findings demonstrate that neurodynamic sliding is a valid and successful stroke intervention that enhances key hamstring flexibility and range of motion in a sample of stroke patients. In hemiplegic patients, NDST exhibits negligible discernible significance. This NDST would be used for long-term effects because of the noticeable clinical results of this instant procedure. Pre-test and post-test mean values (J Anandhraj, A Kumaresan et al ; 2020)

Our research concluded that while both the NDST and self-MFR are useful for increasing hamstring flexibility, the NDST methodology demonstrated a higher degree of improvement than the self-MFR method. To ascertain the best course of action for these treatments and their efficacy in clinical populations with hamstring strains or injuries, more investigation is necessary. (Amreen Afsarpatel Shaikh,1 Maliha Fatima Quraishi, et al; 2023)

According to this survey, less than 80 degrees is the knee range of most college-bound students. Additionally, studies reveal that two out of four people have experienced low back discomfort at some point. Every age group included in this study has experienced this pain. Some students have tight hamstrings because they participate in sports and use their hips and knees more than other students, such as football players and athletes. However, some do not because they stretch their muscles both before and after doing

sports. This leads us to the conclusion that prevalence is higher among students enrolled in college. The primary cause of this is lifestyle adaption. (P Hemamalini, M Kamalakannan, et al., 2020)

There is general agreement that in order to maximize task performance, range of motion, timing, stability, and injury prevention, the body must have the capacity to modify flexibility factors. The ability to alter length-tension is a property of flexibility, which is constituted by intricate interactions among several tissues. According to the study's findings, a single Bowen Technique session significantly improves hamstring muscle flexibility in asymptomatic patients. One week of this level of increase is sustained, suggesting further progress. More research is required to determine how the Bowen Technique affects motor control characteristics, injury rates, and the processes underlying the identification and reaction to manual therapy in both diseased and healthy tissues. (Marriage, Baker, Lambon, Perry, et al., 2011)

Based on statistical analysis, we conclude that Popliteal angle, the sit and reach test for flexibility, and the hand-held dynamometer for strength measurements were all improved by three sessions on alternate days for a week. However, the Bowen technique has demonstrated greater improvement in hamstring flexibility and range of motion than the muscle energy technique. Muscle energy technique showed a greater increase in strength than Bowen technique. It can be suggested for usage by individuals with hamstring tightness because this study produced greater results in healthy subjects. This study examines the immediate effects of hamstring flexibility, allowing for further research on the long-term preservation of hamstring muscle flexibility. These methods can be applied to athletes as well. Since just a small number of people were recruited for this study, more subjects could be added for future research. (Vijay Kage1, Farhana Bootwala ,et al ; 2017)

Stretching is not as effective as neurodynamic treatment, which appears to be the best choice for improving hamstring muscle extensibility and passive knee extension range of motion. Despite the fact that neural mobilisation might be a helpful way to increase hamstring flexibility, it should be used cautiously because to the heterogeneity of the articles. Not with standing these reservations, the study and meta-analysis provide encouraging findings and practical application-related information. (LL López, AO Rubio, JR Torres, et al., 2019).

7 Conclusion

The results showed that the Neurodynamic sliding with the stretching are more effective than Bowen technique as the Neurodynamic sliding showed a higher positive outcome than the Bowen technique in hamstring tightness among college students.

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