Multi-Disciplinary Journal
ISSN No- 2581-9879 (Online), 0076-2571 (Print)
www.mahratta.org, editor@mahratta.org

Direction-Based Kinesiotaping: A Method to Improve Knee Extension in Healthy Adults

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Abstract:
Hamstring flexibility is an important component of fitness. Kinesiotape uses a protective and rehabilitative taping technique. Selection of type of kinesiotaping and stretching is an important factor for improving hamstring tightness. Aim is to find out the effect of applied direction of kinesiotaping from origin to insertion of hamstring on active knee extension in healthy individuals with hamstring tightness. Objective is to determine the effect of applied direction of kinesiotaping from origin to insertion of hamstring on active knee extension in healthy individuals with hamstring tightness with the help of goniometer. Methodology: 60 healthy individuals between 18-26 years of age included in the study. Active knee extension test was measured with popliteal angle less than 160 degrees with the help of Goniometer. Group A (n=30) was applied with kinesiotaping from origin to insertion for 3 days. Group B (n=30) was given only holds relax stretching of hamstring for 3 days. Result: Subjects receiving kinesiotaping from origin to insertion shows statistically significant results with p value < 0.001 in post intervention score of active knee extension test. Conclusion: The study concluded that there was better improvement of kinesiotaping from origin to insertion of hamstring on active knee extension test in healthy individuals with hamstring tightness.

Keywords
Active knee extension, Kinesiotaping, Hamstring

Introduction
Aim is to find out the effect of applied direction of kinesiotaping method on active knee extension in healthy individuals with hamstring tightness. Objective is to determine the effect of kinesiotape application from origin to insertion along with hold relax technique for hamstring muscle on active knee extension.

The hamstring group consists of three major muscles— the semitendinosus, semimembranosus, and biceps femoris— all originating from the ischial tuberosity. These muscles are commonly identified as one of the most frequent sites of tightness in the body. Maintaining adequate hamstring flexibility is essential for optimal mobility, enhanced athletic performance, and injury prevention. Hamstring tightness is a common musculoskeletal condition characterized by reduced extensibility of the hamstring muscle group, often leading to restricted range of motion in the hip and knee joints, altered movement patterns, and an increased risk of musculoskeletal injury. The hamstrings play a crucial role in gait, postural control, and athletic performance; therefore, limitations in their flexibility can impair functional activities such as running, lifting, and bending. Tightness in this muscle group is frequently associated with prolonged sitting, inadequate warm-up routines, muscle imbalance, neural tension, or compensatory patterns secondary to low back pain. Clinical assessment tools, such as the active knee extension test and sit-and-reach protocols, have shown reliability in quantifying hamstring extensibility and monitoring therapeutic progress.

As two-joint muscles, the hamstrings shorten across both the hip and knee when they contract with the hip extended and the knee flexed beyond 90 degrees. During progressive knee flexion, the

hamstrings weaken not only due to nearing maximal shortening but also because they must counter the rising tension of the rectus femoris, which approaches passive insufficiency.
Hamstring tightness is commonly assessed using the Active Knee Extension Test (AKET), which measures the angle formed by knee flexion after maximal active knee extension with the hip maintained at 90 degrees. The AKET has demonstrated excellent test–retest reliability (0.99 for both limbs), attributed to rigorous body stabilization, a clearly defined movement endpoint, and precise instrument positioning.

Kinesiotaping (KT), developed by Japanese chiropractor Dr.KenzoKase in the 1970s, has gained widespread use in rehabilitation and sports medicine. KT is an elastic, latex-free, hypoallergenic cotton tape capable of stretching 55–60% of its original length. Its unique structure, including a wavy acrylic adhesive pattern, allows moisture evaporation and permits continuous wear for 3–5 days. KT is widely used as a supportive, protective, and rehabilitative taping method.kinesiotape is an elastic adhesive tape designed to mimic the properties of human skin, allowing for unrestricted movement while providing continuous sensory feedback. Unlike rigid athletic tape, kinesiotape aims to facilitate muscle activity, reduce pain, and modulate soft-tissue tension through its elastic recoil and cutaneous stimulation. Its application is based on principles such as lifting the skin to increase interstitial space, promoting lymphatic flow, altering neuromuscular excitability, and influencing joint biomechanics. Application of kinesiotaping for hamstring tightness typically involves longitudinal strips placed along the length of the hamstring muscles with varying degrees of tension depending on the therapeutic goal. The proposed mechanisms behind its effectiveness include improved muscle extensibility, enhanced blood circulation, reduced myofascial adhesion, and increased afferent input to the central nervous system, which may modify muscle tone. Studies have reported mixed but promising results regarding its capacity to acutely improve hamstring flexibility in healthy individuals, athletes, and those with musculoskeletal dysfunctions. Research by Merino-Marbán and colleagues (2011) demonstrated an immediate increase in hamstring extensibility following kinesiotape application in university students, while other studies in athletic populations have shown enhanced range of motion without compromising performance.

Although the exact physiological mechanisms remain under debate, kinesiotaping is widely used as a complementary intervention alongside stretching, myofascial release, and strengthening programs. Its advantages—non-invasiveness, comfort, ability to remain in place for several days, and suitability during activity—make it particularly appealing for managing hamstring tightness in both clinical and sports settings. However, variability in application techniques, tape tension, and individual response patterns underscores the need for further research to clarify its efficacy and optimal usage.

Collectively, kinesiotaping represents a clinically relevant approach to addressing hamstring tightness by combining mechanical and neurosensory effects that may influence muscle extensibility and functional mobility. As evidence continues to evolve, understanding its potential benefits and limitations is essential for physiotherapists and sports practitioners seeking effective strategies for managing reduced hamstring flexibility.Kinesiotaping is also applied in the direction of insertion to origin that also showed improvement in improving hamstring flexibility in healthy adults.

Methodology

This study employed a comparative experimental research design. Primary data were collected directly by the principal investigator over a period of six days. Healthy male and female participants aged 18–26 years with clinically identified hamstring tightness were recruited. A total of 90 participants meeting the inclusion criteria were enrolled and then randomly divided into three groups, each consisting of 30 subjects.Study design:Comparative experimental study.Sampling technique: Random sampling

Participants were included if they demonstrated hamstring tightness as determined by the Active Knee Extension Test (AKET), showing a popliteal angle of less than 160°. Both males and females within the defined age range were eligible.
Individuals were excluded if they had: A history of spinal or lower limb injuries, Limb length discrepancies, Any spinal or lower limb deformities, Neuromuscular conditions, Cardiovascular disorders, Known skin allergies, Any previous surgical procedures, Lack of cooperation. The primary outcome measure for the study was the Active Knee Extension Test.

For the taping intervention: Tape 1 was applied starting from the head of the fibula and extended toward the hamstring origin at the ischialtuberosity.Tape 2 was placed beginning at the pesanserinus insertion and directed upward toward the ischial tuberosity, after which the base was secured. In both applications, the tape was rubbed to activate adhesion while the muscle was positioned in a lengthened state. Kinesiotape was applied on day 1, removed and reapplied on day 4, and finally removed completely on day 6.

Discussion

Kinesiotaping from origin to insertion(Group A), the direction of pull of fascia and direction of shrinkage of tape is towards the origin that causes more of muscle contraction to facilitate a muscle that causes increase in flexibility of muscle.Eccentric contraction i.elengthening of the hamstring muscle occurs that causes improvement in flexibility of the muscle that allows a full range of motion.Applying kinesiotape from origin to insertion is theorized to increase muscle activation by aligning the tape with the natural direction of muscle contraction. The elastic recoil of the tape provides mild resistance, enhancing sensory input to muscle spindles and cutaneous receptors. This heightened proprioceptive feedback may improve neuromuscular control and coordination, resulting in better muscle engagement during movement. In tight or inhibited muscles, this can help normalize muscle firing patterns, reducing compensatory patterns that contribute to stiffness.

According to Kase (2008), Kinesio® taping can be used to facilitate muscles that are excessively contracted. Dr.Kase proposed several potential therapeutic effects of the tape, including its ability to create gentle skin convolutions through its elastic properties, thereby increasing the space between the skin and underlying tissues. This mechanism may enhance blood and lymphatic flow, promote neurological modulation to decrease pain, improve joint range of motion, and help correct muscle, fascial, and joint misalignment.

One of the key advantages of Kinesio taping is that it can improve muscle function, whether the muscle is weak or overly tight. By reducing excessive muscle tone, the tape can help decrease overactivity in contracted muscles. Hold-relax stretching improves flexibility through the effects of autogenic inhibition, a reduction in excitability of a contracting or stretched muscle, increased inhibitory input arising from Golgi tendon organs (GTOs) within the same muscle.

Hence, the present study provides evidence that the applied direction of kinesio taping from origin to insertion method is effective on active knee extension in healthy individuals with hamstring tightness.

Conclusion

Participants with hamstring tightness who received kinesiotaping applied from origin to insertion combined with the hold–relax technique demonstrated greater improvement in active knee extension than those who received kinesiotaping alone.

The scope of this study suggests that the intervention may be expanded to compare outcomes between healthy individuals and patient populations. This approach may be useful for physiotherapists aiming to achieve immediate improvements in hamstring flexibility in individuals presenting with tightness.

Limitations

Besides healthy group, patients with hamstring injury can be included in further studies. Study could have been conducted on patients with different age groups.

Clinical implications

To compare healthy and patients with hamstring injury can be included in further studies. Similar study can be carried out to observe the difference in the effectiveness of kinesiotaping to reduce hamstring tightness in between male and female.Studies in the future could also expand the participant pool by using children, adolescents, adults, and elderly participants.In future study can be carried out with broader range of age group.

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