

# The Effects of Kinesio Tape on Hamstring Flexibility

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## Abstract

- Objectives:* To determine if Kinesio Tape has an effect on hamstring flexibility when taped using control, inhibition, and facilitation methods of taping
- Methods:* A study was conducted regarding the effects of Kinesiotape therapy on hamstring flexibility. A total of 45 subjects with the appropriate criteria for participation were separated into three groups. Every participant had their hamstring flexibility measured by using a Sit-N-Reach machine prior to being taped. Fifteen participants were blindly taped with Kinesiotape, another fifteen with inhibiting tape, and the other fifteen with a non-affective control tape. They were then instructed to walk ½ a mile and were then re-measured on the Sit-N-Reach. They were instructed to return the following day to be re-measured in order to see any changes that may have happened over the 24 hours. The researchers expected the subjects with the Kinesiotape to improve their hamstring flexibility.
- Results:* The researchers had a null hypothesis, in order to test the significance of the measurements, that the group with Kinesiotape would not have data that was different from the control group's data. The Kinesiotape group demonstrated some improvements relative to their pre-tape measurements, as expected, but relative to the control group, the data was not significantly different. Therefore, the null hypothesis could not be rejected.
- Conclusion:* The study demonstrated that in this case, under these circumstances, the Kinesiotape did not make a significant difference in the flexibility of the hamstrings of the subjects. The inhibitory tape also did not make a significant difference in inhibiting flexibility of the hamstrings. A future study could incorporate different ideas such as increasing the amount of time between the measurements, so instead of 24 hours it could be a week. These data will help develop future studies for the further analysis of the effects of Kinesiotape and the benefits it has on patients and their care.

## **The Effects of Kinesio Taping on Hamstring Flexibility**

### **Introduction**

*Purpose:* The purpose of this study was to determine the effects of kinesio taping (KT) on hamstring flexibility using different taping techniques. The taping techniques utilized were a facilitation of the biceps femoris, and inhibition of the same muscle as well as tape applied with no tension at all. Forty-five healthy subjects with no history of lower extremity injury participated in the study. Subjects performed 3 experimental measurements 3 different times. The test measured their sit and reach distance when they first came in, after walking ½ mile with a KT technique applied and 1 day after wearing the KT tape. After evaluation of all of the data the KT technique that produced the greatest change in measurements was 7.0cm increase in flexibility on the first day and 6.7cm increase in flexibility on the second day. Further investigation of Kinesiotape is warranted.

*Physiology:* There are three muscles in the back of the thigh that are collectively known as the hamstrings--the semimembranosus, the semitendinosus and the biceps femoris. One of their major characteristics is that they cross two major joints, the hip and the knee. The hamstring muscles are the major flexors of the knee and also aid hip extension. Individuals who sit for prolonged periods of time are predisposed to developing tightness in the hamstrings, as are athletes who compete in sports that require bursts of speed, such as sprinters. Tight hamstrings can be a serious problem for both athletes and non-athletes alike. Tight hamstrings increase the risk of lower back pain and knee pain, conditions that can hamper one's performance in sport and exercise.

The amplitude of a muscle is the change in length from its state of full contraction to full stretch. Physiologically full stretch occurs in the hamstrings group only if the knee is fully extended with the hip fully flexed. Complete contraction occurs when the knee is fully flexed and the hip fully extended. Complete contraction and stretching rarely occur in normal daily activity and the hamstrings are therefore rarely put through their full physiological amplitude. This is a common phenomenon with 'two joint muscles'. For this reason 'two joint muscles' are the ones most commonly injured in sport during acute stretching.

Biomechanically the synchronization between two joints is a complicated proprioceptive and mechanical task. This is complicated further when muscle units cross both joints. Muscles, which have not been trained to employ their full amplitude, may fail when required to pass through their full amplitude under rapid and stressful situations. This results in varying degrees of muscle damage.

*Etiology:* There are a few reasons for developing tightness in the hamstring, genetics, acute injury, chronic injury adaptation. Some people are born with genetically short hamstrings and put these people at risk for injuries in their future. The person who is sitting all day such as a desk worker or student has adaptive changes take place that can shorten their hamstrings as well. This is serious in student athletes that sit for an extended period of time and then go out and load this muscle with a large amount of force. Risks of injury will increase once this adaptation starts to occur.

*Kinesiotape*: One of the main treatments for people with tight hamstrings is stretching. Its effectiveness has been questioned and some studies report that it may actually increase the incidence of injury prior to an event. This may be true because the stretch prior to the activity injures the muscle and the muscle tears at that injury site when it is load with more force. Kinesio Tape is a passive stretch on the overlying skin and fascia that affects the muscle different then a static active stretch. Kinesio tape has been shown to support muscle movement, relieve abnormal feeling or pain on the skin or fascia, correct misalignments of the muscle fascia and joints. Research by Mori et al suggests that KT normalizes muscle function. By using KT on the skin, the stimuli are more easily conducted to the motor areas of the brain (somatic sensation-induced brain wave). (9) KT tape has not been shown to increase muscle strength per se, but shows normalization of function and coordination of movement and neural signals. The application of the tape can alter the desired effects as well. A study by Kase et al observed that the stretch rate and width of the K Tape affected the fascia and flow of lymph fluid. (10)

## **Materials & Methods**

A total of 45 subjects with the appropriate criteria for participation were separated into three groups. The criteria for participation was done through a questionnaire on the consent form that all of the participants signed. Every participant had their hamstring flexibility measured by using a Sit-N-Reach machine prior to being taped. Fifteen participants were taped with Kinesiotape using the facilitation method, another fifteen with inhibiting tape, and the other fifteen with a non-affective control tape. They were then instructed to walk .5 miles and were then re-measured on the Sit-N-Reach. They were

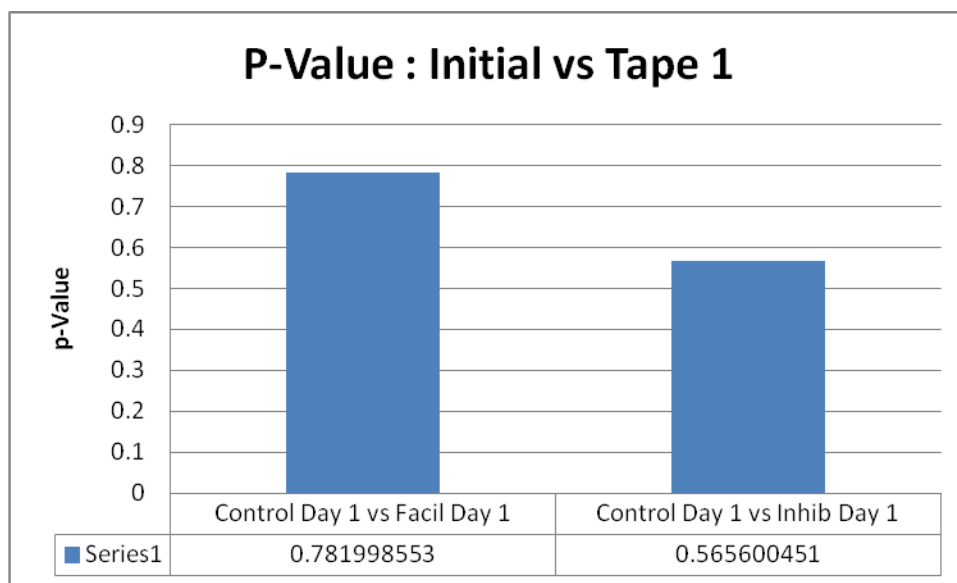
instructed to return the following day to be re-measured in order to see any changes that may have happened over the 24 hours. Instructions on how to wear and remove the tape was given after application on the first day. A track or treadmill was used to perform the walking required during the study and black Kinesiotape measured to the appropriate size for the subject was used on both hamstrings. All flexibility measurements were taken using the Sit-N-Reach box.

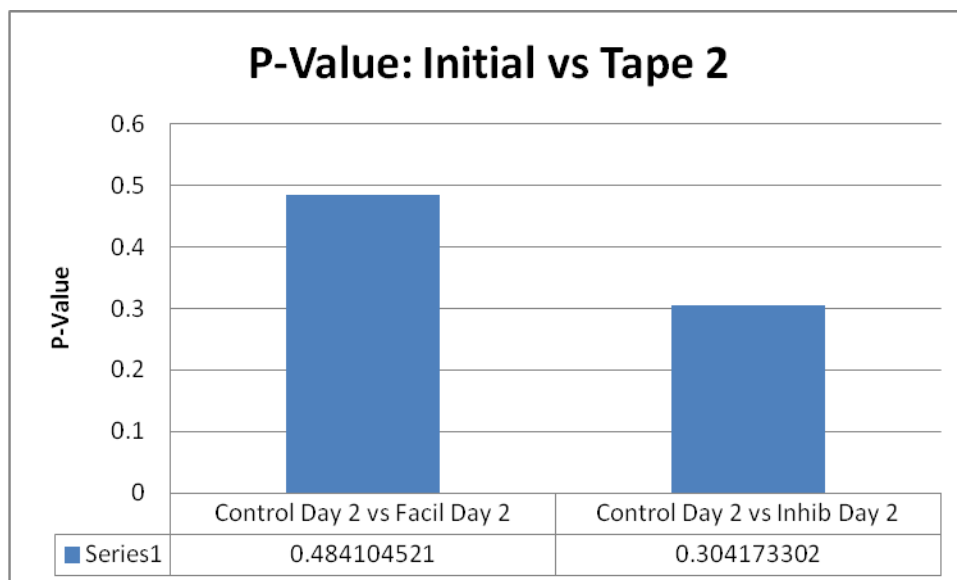
## **Results**

The researchers had a null hypothesis, in order to test the significance of the measurements, that the group with Kinesiotape would not have data that was different from the control group's data. The data that was recorded came in measurements of centimeters and was measured using the base of their feet as the zero mark. A T-Test was performed between the control group and either the facilitated or the inhibited group at the different measurements of initial versus either post-tape 1 or post-tape 2. A P-Value was acquired using the T-Test, and with the null hypothesis in place, our P-Values allowed us to either accept or reject the null hypothesis. If the acquired P-Values were less than 0.05, the null hypothesis would be rejected and the measured differences would be significant. However, if the P-Values were higher than 0.05, the null hypothesis would be accepted and the measured differences would be insignificant.

The Kinesiotape group demonstrated some improvements relative to their pre-tape measurements, as expected, but relative to the control group, the data was not significantly different, according to the calculated P-Values. They are as follows: Control group Day 1

versus the Facilitated group Day 1 was 0.78, Control group Day 1 versus inhibited group Day 1 was 0.57. These are the measurements that show the p-values between the differences of the means of Control day 1 measurements (pre-tape and 1st tape measure) and facilitated and inhibited groups 1<sup>st</sup> day measurements. These values would not allow our null hypothesis to be rejected. The other values are as follows: Control group Day 2 versus Facilitated group Day 2 was 0.48, and the Control group Day 2 versus Inhibited group Day 2 had a P-Value of 0.30. This shows the two p-values between the differences of the means of Control group day 2 measurements (pre-tape and 2nd tape measure) and facilitated and inhibited groups 2<sup>nd</sup> day measurements, who's P-Values also do not allow the null hypothesis to be rejected, preventing the measurements differences from being significant.





## Discussion

According to “Activation of Cerebral Cortex in Various Regions After Using Kinesio Tape”, (9) Kinesio Tape (KT) has been used and proven to increase somatosensory recognition and proprioception from the periphery to the cortex. It has also been speculated to help promote posture and walking in the elderly. (6) During a study of ankle sprains performed by Jayson M. Goo, it was found that the athletes who did not receive the Kinesio Tape as part of their post injury rehab had increased joint effusion and increased time to recovery and return to sport. (2) “The major four major effects of Kinesio Taping is to relieve pain or abnormal feeling on the skin and fascia, supports the muscle in movement (with expanding effects), removes congestion of lymphatic fluid or hemorrhages under the skin, and corrects misalignment of the muscle, fascia, and joint.” (4) A study was performed on dancers associated with muscle disorders and fatigue. Kinesio Tape was used to correct biomechanical movements/habits, thus allowing them to create more power throughout



their movements and effectively improve their performance. (1) Dr. Heather Murray researched the effects of Kinesio Tape used as postural therapy and the results were that the tape helped improve posture of scapular disorders and significantly relieve posterior and anterior musculature pain. (7) Kinesio Tape has also been proven to help stroke victims due to the fact that “restoring trunk and scapular alignment after the stroke is critical in an effective treatment program for the upper extremity in hemiplegia”. (3) The purpose of this research project was to identify the Kinesio Tape’s effects on hamstring flexibility. We hypothesized that the hamstring flexibility would improve with the inhibition taping and decrease with the facilitation taping.

Some ways in which the results may have been skewed are that some people chose to walk their half mile inside on the treadmill and not outside on the track because it was cooler. The difference has more to do with climate than locations, the hamstring muscles may have been better prepared for activity in the outside environment instead of the inside environment. Having placed black tape on the individual’s hamstrings combined with the added heat and the direct sunlight, the tape might have adhered better for those who chose to walk outside. The activity level of the people involved in the study may also alter the results. If the person is not normally active and has tight hamstrings from sitting in class all day, getting out and walking a half mile may have made them sore the next day, thus not allowing them to stretch to their full potential. In order to facilitate or inhibit a muscle, a certain amount of tension has to be placed on the tape when applied, it is possible that the tension may have varied a little between examiners and between tapings, however if this happened we did not notice. When taping the control group, it was hard to lay the tape

without any tension, therefore this could be a way in which the taping may have had tension and created an increase/decrease in flexibility. Lastly, a few people's tape did not last through to the next day, they either took it off, or it fell off.

From the results that were gathered, it was determined that the group utilizing the inhibition technique demonstrated a greater overall increase in hamstring flexibility; however, the results were not statistically significant. The group utilizing the facilitation technique demonstrated a decrease in hamstring flexibility when compared to the control group, however this too proved to be statistically insignificant.

It was noted in "Examination and Considerations of the Effects of the Stretch Rate of Kinesio Taping on the Skin: Second Report" that the width and stretch rate of the Kinesio Tape caused changes and differences in the fascia.(5) This could be a contributing factor in the flexibility of the hamstrings.

## **Conclusion**

We concluded that Kinesio Tape does have an impact on the tension placed on the muscles utilizing different taping techniques; however, it is difficult to determine how much of an impact was the tape versus the environment in which the study was performed.

The use of taping methods may play a role in hamstring flexibility. We believe that Kinesio Tape may provide a proprioceptive feedback that determines the flexibility level of the hamstring.

If this study were performed in the future, it would be interesting to see how the hamstrings of people with similar lifestyles respond. This would include those that have a relatively sedentary lifestyle, athletes, and moderate exercisers. In narrowing down the groups, or performing the study again on all these groups, it will give a more accurate response and reading due to the previously mentioned variables. Having a larger sample size would increase the data and provide more information to better assess the results. It would benefit the results if in the next study, all the participants performed the half mile walk in the same environmental situations. Also, it may be interesting to see what the results would be if during the second day the participants had to measure in at the beginning, walk a half mile, and measure out at the end like the initial day. In addition to the other improvements, if this study is performed again, facilitating the quadriceps while inhibiting the hamstrings may prove to have better results for increased flexibility. While inhibiting the quadriceps and facilitating the hamstrings would be hypothesized to produce a decrease in flexibility. Other variables that can be tested would be; tension of the tape, width of the tape and measurement of the muscle using an EKG to determine if it increased motor unit recruitment.

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