



Original Article

Effects of Kinesio taping on joint position sense of the ankle

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Abstract. [Purpose] The purpose of this study was to examine the effect of Kinesio taping on the joint position sense of the ankle. [Subjects and Methods] The subjects of this study were 26 normal adults who had experienced ankle sprain. Kinesio taping was applied over the ankle medial ligament and ankle lateral ligament with eight pattern reinforcement taping. Joint position sense was measured using isokinetic equipment (Biodex System 4 pro dynamometer, Biodex Medical systems Inc., USA) during dorsiflexion/plantarflexion and inversion/eversion, before and after taping. Statistical analyses were performed using SPSS 21.0 for Windows. [Results] Joint position sense after Kinesio taping was improved in the dorsiflexion and inversion positions. [Conclusion] According to the results of this study, Kinesio taping of the ankle is effective for the prevention of ankle sprain.

Key words: Ankle sprain, Kinesio taping, Joint position sense

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INTRODUCTION

Ankle sprain frequently occurs in sports and daily living^{1, 2)}. The most common type of ankle sprain occurs when the foot is inverted too much, affecting the lateral side of the foot³⁾. Recurrence of ankle sprain causes ankle instability, which is commonly associated with muscle weakness and defective proprioception⁴⁾.

Among a variety of ankle stabilizer methods, taping is currently used immediately following injury and during the rehabilitation process. The purpose of taping is to prevent injuries from the onset, reduce the injury frequency rate, and minimize the severity of injuries when they do occur, by applying taping over different joints in a manner appropriate for each sport⁵⁾. Among a variety of ankle taping methods, Kinesio taping has positive effects on correcting muscle function, circulation of blood, decreasing pain, repositioning subluxated joints, restoration of the function of the fascia and muscle, and improving proprioception⁶⁻⁸⁾.

Little is known about the possible proprioceptive effect of Kinesio tape, however it is anticipated that it has a facilitatory effect on cutaneous mechanoreceptors as seen after the application of adhesive athletic tape⁵⁾. Therefore, the present study investigated the effect of Kinesio taping on proprioception via the measurement of ankle position-reposition error.

SUBJECTS AND METHODS

Twenty-six normal adults who had experienced ankle sprain, with no history of any previous serious ankle injury or surgery or ankle pathology were recruited, for this study. The general characteristics of the subjects were as follows: age, 21.26 ± 0.79 years; height, 168.85 ± 8.35 cm; weight, 64.72 ± 14.4 kg. All the patients understood the purpose of this study and provided their written informed consent prior to their participation, in accordance with the ethical principles of the Declaration of Helsinki.

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The joint position sense of the subjects with sprained ankles was first examined after a five-minute rest before the ankles were wrapped with Kinesio Tape. Reproduction joint position sense was measured using isokinetic equipment (Biodex System 4 pro dynamometer, Biodex Medical systems Inc., USA) during dorsiflexion/plantarflexion and inversion/eversion, before and after Kinesio taping.

To ensure reproduction joint position sense was affected only by mechanoreceptors within the ankle, subjects were blindfolded. The Kinesio taping was applied over muscles in a stretched position without over-stretching the tape. For the collateral ligament, the ankle was placed in an inverted position while the taping was applied from the calcaneus to the talus. Over this tape, another tape was applied at 90 degrees was placed 20 centimeters above the lateral malleolus and medial malleolus. The middle section of the tape under the center of the sole so that the tape was applied over the top of the foot while covering the foot from the toes to the Achilles tendon in a figure of eight shape. The ankle position sense was used to measure the difference between the start and return positions. The subjects were told to memorize the position because it was the start position. Then, they performed full dorsiflexion of the ankle and held it. Following this, the subjects, with their eyes still closed, were instructed to return to the start position. The stopping position of ankle joint was marked. The absolute error value was measured as the angle between the start position and the reposition. The same procedure was followed for plantarflexion and inversion/eversion. In order to compare the measurements before and after the taping, the paired t-test was carried out. Statistical analyses were performed using SPSS 21.0 for Windows (SPSS Inc., Chicago, IL, USA) with a significance level of $\alpha=0.05$.

RESULTS

There was a significant difference in the error values of the joint position sense (in ankle dorsiflexion and inversion between) those of before and after the taping (Table 1). However, the plantarflexion showed no statistically significance difference.

DISCUSSION

The purpose of this study was to examine the effects of Kinesio taping on the proprioception of the ankle via the measurement of ankle position-reposition error. The results show that ankle taping resulted in a significantly lower position-reposition error than that of no taping.

Proprioceptive signals are sent by afferent fibers from proprioceptive receptors which are located in the ligaments, capsules, transdermal tissues and muscles, and muscle afferent fibers provide the most important information to most of the joints in the body. When there is a decline in proprioceptive control, it is highly likely to present with declines in postural control and protective reflex, joint movement, and the ability to control perturbation^{9, 10}. Proprioceptive control plays an important role in reducing functional instability and re-injury of the joints, hence a decline in proprioceptive control may lead to a reduction in joint stability and an increase in the injury frequency rate¹⁰.

Among a variety of ankle stabilizer methods, the Kinesio taping method helps muscles to stretch as much as possible and restores the skin and muscles to their original state when the tape is applied over muscles without being overstretched^{5, 6}. It is believed that if the taping is done in a way that creates enough space between the skin and the muscles, there is greater mobility of the muscles, and reduction of pain due to active circulation of blood and proprioception. Kinesio tape elicits an increase in proprioception through increased stimulation of cutaneous mechanoreceptors^{6, 7, 11}.

Returning to activity before the ligaments have fully healed may cause them to heal in a stretched position, resulting in less stability of the ankle joint. This can lead to a condition known as chronic ankle instability, and an increased risk of ankle sprains. According to the findings of this study, there was an improvement in the joint position sense during ankle dorsiflexion and inversion after taping. A possible reason for this result is that the most common types of ankle sprain are induced by sudden dorsiflexion and inversion¹².

In conclusion, our findings suggest that taping can be effective in the prevention and treatment of ankle sprains, as it improves proprioceptive control during dorsiflexion and inversion.

Table 1. Comparison of pre- and post-taping joint position error

Test	Pre-taping	Post-taping
Dorsiflexion	3.46 ± 2.24	2.46 ± 1.66*
Plantarflexion	3.01 ± 1.79	2.80 ± 0.82
Inversion	5.98 ± 3.9	4.01 ± 2.49*
Eversion	3.45 ± 2.45	3.46 ± 2.81

*p < 0.05

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