

EFFECT OF KNEE TAPING ON THE KNEE KINEMATICS DURING LEVEL WALKING

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The purpose of this study was to investigate the effect of knee taping on the knee kinematics during level walking. Fifteen healthy subjects participated in this study. Vicon Nexus motion analysis system was used. Reflective markers were placed on anatomical landmarks to compute the kinematics during level walking. Knee joint angle and range of motion were analyzed. Paired t test was used to compare the differences between no taping and knee taping. The results showed that the knee taping would increase the external rotation and decrease the internal rotation of the knee joint during level walking. Knee taping would decrease the adduction angle and the range of motion in the frontal plane during level walking compared to no taping. It is suggested that knee taping can be used for the people with ACL insufficiency to enhance the knee stability.

KEY WORDS: knee taping, level walking, anterior cruciate ligament injury.

INTRODUCTION: Anterior cruciate ligament (ACL) injury is a common injury in sports activities. The function of ACL is to maintain the proper alignment between femur and tibia and to limit the anterior translation of the tibia in functional activities or sports. It was prone to lead to knee instability after ACL injury. Taping is frequently used to provide the immediate support for the enhancement of the joint stability in the acute injury. Knee taping has been used to prevent the secondary injury after the ACL injury or following the ACL reconstruction surgery. However, little is known about the effect of the taping on the knee kinematics. Therefore, the purpose of this study was to investigate the effect of knee taping on the knee kinematics during level walking.

METHODS: Fifteen healthy subjects participated in this study (age: 21.7 ± 2.9 years; weight: 71.2 ± 12.0 kg; length: 173.3 ± 6.4 cm). Nineteen reflective markers were placed on the selective anatomical landmarks bilaterally, including anterior superior iliac spine, sacrum, lateral thigh, lateral and medial epicondyle of the femur, lateral shank, lateral and medial malleolus, the second metatarsophalangeal joint and the heel. Vicon Nexus motion analysis system (Oxford Metrics LID, UK) was used to collect the trajectory of the reflective markers. Euler angles were computed for the kinematical analysis.

There were two testing conditions: no taping and knee taping. Knee taping used in this study was the combined taping, which consisted of rotary taping and collateral ligament taping (Prentice, 2009). The dominant leg was the testing side. Each subject was asked to perform the level walking for three repetitions for each testing condition. The testing order was random for each subject. The analyzed variables were the peak knee angles and range of motion in the frontal and transverse planes during the stance phase of the gait cycle. Paired t test was used to compare the kinematic differences between no taping and knee taping. The significant level was set as $\alpha=0.05$.

RESULTS: The maximum knee angle and range of motion in no taping and knee taping conditions was shown in Fig 1. Knee taping showed significantly lesser adduction and internal rotation but greater external rotation than no taping ($p<0.05$). Knee taping showed significantly lesser range of motion in frontal plane than no taping ($p<0.05$).

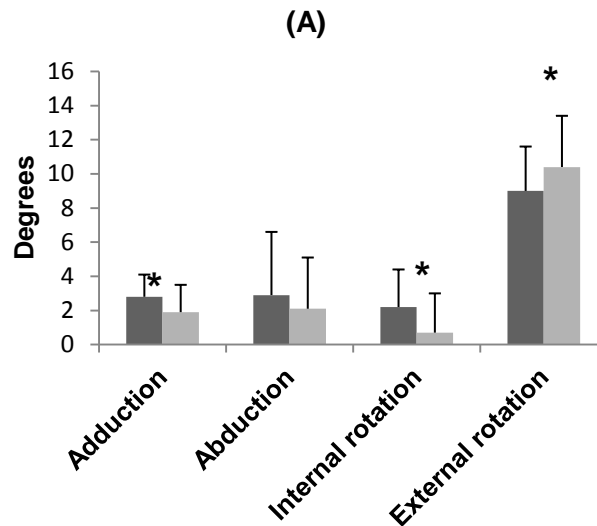


Figure 1: Maximal knee angle (A) and range of motion at knee (B) during level walking (*p<0.05).

DISCUSSION: The ranges of motion in the frontal and transverse planes in knee joint have been used to quantify the knee stability for the people after ACL injury. A greater abduction or adduction motion in the flexed knee would increase the risk of ACL injury (Griffin, 2006). The rotational instability at knee has been found in the people with ACL insufficiency (Ristanis, 2006). Georgoulis et al. (2003) indicated that internal rotation of the affected knee in the people with the ACL insufficiency was significantly greater than that in the healthy people during swing phase of level walking. Gao (2010) indicated that compared to the healthy people, greater adduction and lesser external rotation of the affected knee in gait cycle were found in the people with ACL insufficiency. The results of this study showed that knee taping could increase the external rotation and decrease the internal rotation during level walking. Compared to no taping, knee taping could also decrease the adduction angle and the range of motion in frontal plane during level walking. Knee taping could restrain the knee joint angle and improve the knee stability in frontal and transverse planes and it might reduce the risk of re-injury for the people with ACL insufficiency.

CONCLUSION: The findings of this study showed that knee taping could increase the external rotation, and decrease the internal rotation and adduction in the knee joint during level walking. Knee taping could be suggested for the people with ACL insufficiency to enhance the knee stability.

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