



Original Article

Immediate effect of ankle balance taping on dynamic and static balance of soccer players with acute ankle sprain

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Abstract. [Purpose] This study aimed to evaluate the immediate effect of ankle balance taping on balance ability of soccer players with acute ankle sprain. [Subjects and Methods] This study was conducted with 16 subjects who were diagnosed with ankle sprain. A cross-over randomized design was used. Each subject performed three interventions in a random order. Subjects were randomly assigned to an ankle balance taping, placebo taping, and no taping. For dynamic and static balance, ability was measured using BIORescue (RM Ingenierie, Rodes, France). Limit of stability, sway length and sway speed for one minute were measured. [Results] The Limit of Stability, Sway length and Sway speed differed significantly among the three different taping methods. [Conclusion] In this study, we found that ankle balance taping was effective in terms of improving balance ability of soccer players with an ankle sprain.

Key words: Ankle balance taping, Ankle sprain, Balance

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INTRODUCTION

Ankle sprains are the most common musculoskeletal injuries¹⁾, and athletes with excessive movement and activities are the most common victims. Soccer players perform many running, jumping, and turning movements, and these movements cause excessive range of motion at the ankle joint. This excessive motion range is the most likely cause of ankle sprain in soccer players²⁾.

A person with an acute ankle sprain has functional limitations due to severe pain, a limited range of motion, and increased instability of the ankle. Balance disorder is one of the most common symptoms. Ankle sprain increases the instability of ankle, affecting dynamic and static balance³⁾.

Many treatments are available for ankle sprain depending on the severity of the injury, but the RICES method in the acute phase is the most representative one⁴⁾. RICES means rest, ice, compression, elevation, and support. After such a treatment process is applied in the acute phase, the functional movement of the ankle is improved through treatments including electrostimulation, ultrasound therapy, and manual therapy⁵⁾. The taping method is frequently used to prevent ankle sprain in athletes, and is widely used for therapeutic purposes.

According to Lee et al.⁶⁾ applied to young soccer players with functionally instable ankle, kinesiology taping method increase dynamic balance ability. Hong et al.⁷⁾ reported that application of kinesiology taping to a football player with injury is an effective adjunct therapy.

This study evaluates the effect of ankle balance taping on dynamic and static balance of soccer players with acute ankle sprain.

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SUBJECTS AND METHODS

Sixteen subjects were recruited and all met the inclusion criteria for study procedure. Subjects were recruited from a high school soccer team, after providing informed, written consent. Written informed consent according to the ethical standards of the Declaration of Helsinki was provided by all subjects prior to participation, and all agree to participate in this study. The mean age of the participants was 17.6 ± 0.7 years, height was 175.1 ± 5.2 cm, weight was 77.2 ± 9.1 kg, BMI was 25.0 ± 1.7 , CAIT score was 10.8 ± 4.1 , and days since onset 8.2 ± 3.2 days. The enrollment criteria applied were as follows: (1) Suffered ankle sprain within one month, (2) Cumberland Ankle Instability Tool (CAIT) score $<24^8$, (3) Not participating in any ankle treatment program, (4) No muscular-skeletal disorder and other severe lower extremity injury, (5) No history of ankle fracture and ankle surgery, (6) No ankle edema, (7) No history of neurological disease, vestibular or visual disturbance, or any other pathology, (8) No taping side effects such as skin redness.

A cross-over randomized design was used. Each subject performed three interventions in random order. Subjects were randomly assigned to a taping, placebo taping, and no taping. Subject characteristics and all outcome measures obtained before and after treatment were assessed by Physician 1, who was blinded to treatment allocations. Intervention was performed in a closed room by Physician 2, who was not involved in subject assessment. Both physicians were instructed not to communicate with subjects about study goals or treatments.

This study used Kinesiology tape (Kinematics Tex, SPOL Co., Ltd., Seoul, Korea) with elasticity. The patient is seated in a comfortable position on a table that is high enough to prevent the feet from touching the ground, while the therapist applies the tape on the damaged ankle stretched with a tension of 30–40%⁹.

Ankle Balance Taping (ABT) consists of four stages¹⁰. The first stage is posterior talar gliding taping to increase the dorsiflexion of the ankle. The second stage is inversion taping for the inversion of ankle. The third stage is eversion taping for the eversion of ankle. This stage applies the Kinesiology tape twice, with approximately 50% overlapping. Since the patients have a disability in the inversion of feet due to lateral ankle sprain, taping is done twice to reinforce the inversion of ankle through eversion taping application. The fourth stage applies the posterior talar gliding taping conducted in the first stage twice.

Placebo taping can be classified into two stages¹⁰. The first stage begins from the inner malleolus, and it is applied up to the inner middle point of the pelvic limb. The second stage begins from the outer malleolus up to the outer middle point of the pelvic limb.

For postural adjustment ability, center of pressure (COP) was measured using BIORescue (RM Ingenierie, Rodes, France). The elements measured included the sway length and sway speed to evaluate the static balance ability; low value indicated good balance ability. Also, the element measured included the Limit of stability (LOS) to evaluate the dynamic balance ability; high value indicated good balance ability. Limit of stability (LOS), sway length, and sway speed were measured for one minute.

Statistical analysis was performed using SPSS (SPSS Inc., Released 2009. PASW Statistics for Windows, Version 18.0. SPSS Inc., Chicago IL, USA). General characteristics were analyzed using descriptive statistics and results are reported as means and standard deviations. One-way repeated ANOVA was used for the group analysis, and the post-hoc Tukey test was used to correct for multiple comparisons. Null hypotheses of no difference were rejected if p-values were less than 0.05.

RESULTS

ABT showed significantly difference of Limit of Stability, Sway length, and Sway speed than NT and PT ($p < 0.05$) (Table 1).

Table 1. Comparison of the Limit of stability (LOS), sway length, sway speed among the three conditions (n=16)

	Mean \pm SD			Post-hoc
	NT	PT	ABT	
LOS (mm)	5,943.0 \pm 3,565.8	6,304.7 \pm 3,516.8	8,537.0 \pm 3,472.4	ABT>PT ABT>NT
Sway length (cm)	31.8 \pm 9.6	29.3 \pm 7.7	22.7 \pm 5.8	ABT>PT ABT>NT
Sway speed (cm/s)	0.5 \pm 0.1	0.4 \pm 0.1	0.3 \pm 0.1	ABT>PT ABT>NT

NT: no taping; PT: placebo taping; ABT: ankle balance taping

DISCUSSION

This study investigated the effect of ankle balance taping on the improvement of balance ability of soccer players with acute ankle sprains. After applying ankle balance taping, sway length and sway speed (measures of static balance), and limits of stability (LOS) (a measure of dynamic balance), improved significantly compared to the other two interventions (placebo taping and no taping).

This study proposes that there are several taping mechanisms. First, kinesiology tape is effective in relieving pain. Nicole et al.¹¹⁾ reported that kinesiology taping reduced chronic low back pain (CLBP). Lee et al.¹²⁾ reported that the kinesiology taping badminton players with Achilles tendon pain reduced Achilles tendon pain. Second, kinesiology taping increases the stability of the ankle. Fouladi et al.¹³⁾ proposed that dynamic posture stability is improved if kinesiology taping is applied to the foot.

The current study has several limitations. First, the small sample size may have influenced certain variables and influenced the results. Therefore, these results cannot be generalized to all subjects who have ankle instability. Second, the current experiment is a crossover design, which makes it difficult to observe the learning effect of taping.

Further studies, including a long-term follow-up assessment, are needed to evaluate the long-term benefits of balance taping. In conclusion, the application of Ankle Balance Taping that uses kinesiology tape instantly increased the dynamic and static balance ability of soccer player with an ankle sprain. Therefore ABT can be a useful alternative to prevent and treat ankle sprain of soccer players.

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