The effect of ankle Kinesio taping on range of motion and agility during exercise in university students

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Objective: The purpose of this study was to examine the effects of ankle Kinesio taping on range of motion and agility during exercise in university students.

Design: Cross-sectional study.

Methods: Thirty subjects were randomly allocated to two groups: taping group (n=15) and non-taping group (n=15). All groups underwent the same exercise program including stretching for 30 minutes. The exercise program proceeded in the following order: five minutes of stretching, a 20-minutes exercise program, and additional five minutes of stretching. Of the eight exercise methods suggested by Purcell et al., seven were chosen (lateral shuffle, forward and backward running, agility ladder, figure-of-8, forward jogging while jumping over cones, wall jumps and zigzags); 90° cuts with lateral shuffle were omitted. The range of motion of ankle dorsiflexion and plantarflexion was measured using the goniometer. Agility was measured using the side hop test.

Results: For ankle range of motion, the taping group showed significant differences in dorsiflexion and plantarflexion on both sides (p<0.05). The non-taping group showed significant differences only in left plantarflexion (p<0.05). There was a significant difference in dorsiflexion on both sides between the taping group and the non-taping group (p<0.05). All groups showed significant differences in agility on the left and right ankle (p<0.05). There was a significant difference in left ankles between the taping group and the non-taping group (p<0.05).

Conclusions: Kinesio taping increased range of motion and agility during exercise in university students. Additional research on Kinesio taping for improving range of motion and agility is needed.

Key Words: Agility, Kinesio taping, Range of motion

Introduction

Ankle injury is a common disease incurred during exercise with 85% of ankle injuries being sprains, and 1/3 of ankle injured individuals do not fully recover within a year [1]. Orthosis and taping are used as preventive means to protect the ankle joint. These prevent the ankle joint from an excessive range of motion, and enhance proprioception to adjust balance [2].

Taping is generally used to protect and enhance the joint to prevent further musculoskeletal damage during acute injury, reduce edema, limited the motion of weakened muscles of the injured joint to prevent additional damage from occurring during continuous exercise. In addition, taping enhances strength, the ability to react instantly, endurance to develop exercise performance ability, and parallel forces. Taping is divided into two major methods: elastic taping and non-elastic taping. In particular, elastic taping, the name of which is Kinesio taping, was devised by Gasegenjo.

Elastic kinesio taping is a recently developed bandage technique, attached to the skin. Kinesio tape is thinner and more elastic than conventional tape, producing less mechanical restraint and avoiding the mobility restriction experienced with conventional methods [3]. Yoshida and Kahanov
[4] reported that Kinesio tape is theorized to have several functions: (1) restore correct muscle function by supporting weakened muscles, (2) reduce congestion by improving the flow of blood and lymphatic fluid, (3) decrease pain by stimulating the neurological system, and (4) correct misaligned joints by retrieving muscle spasm.

Aguilar-Ferrándiz et al. [3] reported that Kinesio taping compression therapy improved ankle dorsiflexion during walking, gait parameters, peripheral edema, venous pain, and quality of life in postmenopausal women with chronic venous insufficiency. Kang et al. [5] reported that walking with talus taping is effective for increasing ankle dorsiflexion passive range of motion in individuals with limited motion. Merino-Marban et al. [6] reported that applying Kinesio tape on the calf seems to immediately increase ankle dorsiflexion range of motion, but not after a duathlon competition.

Some theses have investigated the effect of Kinesio taping the ankles of some athletes on posture control skills and ankle dorsiflexion range of motion. Nevertheless, the preceding research is insufficient to determine the effect of taping on the general population, because most participants were either athletes or patients with disease. Therefore, the purpose of this study was to examine the effect of Kinesio tape on general university students, comparing range of motion and agility in a control group. We hypothesized Kinesio taping would result in a significant improvement in range of motion and agility.

**Methods**

**Subjects**

Thirty university students (mean age 20.97 years, height 166.96 cm, weight 63.90 kg) participated in this study. Subjects were randomized into two groups, a taping group and a non-taping group. The inclusion criterion were age between 19 and 25 years and healthy, physically active volunteers [7], with no history of osteoarticular lesion or previous fracture or surgery to the foot [8], free of cardiovascular disease or neurological injury at the time of the experiment [9], non-corrected neurological, vestibular, visual and or hearing impairments, in addition to displaying no allergy to adhesive material [10].

**Table 1.** General characteristics of the subjects (N=30)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Taping group (n=15)</th>
<th>Non-taping group (n=15)</th>
<th>t/x²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (male/female)</td>
<td>9/6</td>
<td>7/8</td>
<td>0.536</td>
<td>0.464</td>
</tr>
<tr>
<td>Age (y)</td>
<td>21.33 (2.72)</td>
<td>20.60 (1.99)</td>
<td>0.843</td>
<td>0.406</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>169.18 (10.98)</td>
<td>164.73 (7.31)</td>
<td>1.305</td>
<td>0.202</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>67.40 (12.66)</td>
<td>59.87 (10.52)</td>
<td>1.772</td>
<td>0.087</td>
</tr>
</tbody>
</table>

Values are presented as n or mean (SD).

General characteristics of the subjects are shown in Table 1. There were 9 males and 6 females in the taping group and 7 males and 8 females in the non-taping group. The averages for age was 21.33 years in the taping group and 20.60 years in non-taping group. The averages for height were 169.18 cm in Taping group and 164.73 cm in non-taping group and weight were 67.40 kg in the taping group and 59.87 kg in the non-taping group. This study was approved by the Sahmyook University’s Institutional Review Board. All subjects signed a written informed consent prior to participation.

**Procedures**

The exercise program proceeded in the following order: five minutes of stretching, a 20-minutes exercise program, and additional 5 minutes of stretching. Of the eight exercise methods suggested by Purcell et al. [11], seven were chosen; 90° cuts with lateral shuffle were omitted. The line length was dependent on the experiment location. The seven exercises were performed at different stations. Six subjects performed one of the seven exercise methods for one minute; after a 30-second break, they changed places and moved between stations, repeating this pattern until all seven exercises had been performed. (1) For the lateral shuffle, participants stood at the line’s starting point. Upon starting a stopwatch, participants moved in the direction of an arrow, changed the direction at the turn of the line, moved laterally, and returned to the starting point (Figure 1). (2) For forward and backward running, participants stood the starting point. Upon starting a stopwatch, participants moved forward along the line. Upon reaching the end of the line, they moved backwards, returning to the starting point. (3) For the agility ladder, participants stood at the starting point of the left