



Differences in Ankle Range of Motion Before and After Activity in Two Taping Conditions



Steven B. Purcell, Brynn E. Schuckman, Carrie L. Docherty, John Schrader, Wendy Poppy
Athletic Training Research Laboratory, Bloomington, Indiana

INTRODUCTION

Ankle injuries are the most common injury in the physically active individuals. (Cordova, J Orthop Sports Phys Ther, 2000; Karlsson, Sports Med, 1993). Because of the increased incidence of ankle sprains and the lingering disability after sprains, prophylactic measures have become an important resource in helping decrease this problem. Preventive prophylactic measures such as taping and bracing are thought to decrease ankle sprain incidence by providing mechanical support (Olmsted, J Athl Train, 2004). It has been documented that tape provides restriction to all the movements that are associated with ankle injuries immediately after tape application (Morris, J Sports Med Phys Fitness, 1982; Gross, J Orthop Sports Phys Ther, 1987). However, even with the prevalent use of prophylactic ankle taping in the clinical setting, it has been well documented that white cloth tape loosens with physical activity and therefore may not provide adequate protection to the joint (Laughman, Am J Sports Med, 1980; Ricard, J Athl Train, 2000). There have been many studies performed on the effectiveness of white cloth tape on range of motion, but little research has been conducted with newly developed tape like Andover PowerTape™/PowerFlex™.

PURPOSE

The purpose of our study was to evaluate the effectiveness of Andover PowerTape™/PowerFlex™ and the white cloth tape on maintaining ankle range of motion restriction before and after activity.

METHODS

Subjects

20 physically active volunteers

(age = 19.8 ± 1.7 years, height = 171.3 ± 11.4 cm, mass = 68.1 ± 8.8 kg)

Exclusion:

Allergy to the Andover products or any adhesive used

Previous history of ankle fracture

Previous history of a sprain or strain of the leg within the last six months

Previous history of surgeries to the lower extremity

Testing Procedures:

All participants were tested on 3 separate days, one for each tape condition.

The tape conditions included: no tape, Andover tape, white cloth tape.



Andover PowerFlex/PowerTape



White Cloth tape

For each day of testing, the following procedures are performed:

- 1) Baseline range of motion testing
- 2) Application of tape condition
- 3) Pre-test range of motion testing
- 4) Exercise protocol
- 5) Post-test range of motion testing

Range of motion testing

Subjects' ankle range of motion was tested using an ankle electrogoniometer. The examiner placed the subject's ankle in subtalar neutral and then instructed them to actively move into either full inversion to eversion or plantarflexion to dorsiflexion range of motion. The range of motion was recorded in degrees.



Exercise Protocol

The examiner first demonstrated the eight station exercise routine, and then asked the subject to demonstrate each station during the five minute warm-up. The subjects were told to exercise at a moderate level while performing lateral shuffles, backward paddling, agility ladder, figure-eight, 90° cuts with lateral shuffle, wall jumps, forward jogging while jumping over cones, and zigzag. The subject repeated the exercise routine for 20 minutes. The number of exercise circuits the subject complete in the 20 minute period were recorded to insure that the subjects were giving a constant intensity for all three days of testing. Subjects finished with a five-minute walk to cool-down.

STATISTICAL ANALYSIS

Two separate repeated measures ANOVA, one for each dependent variable:

- 1) Inversion to Eversion range of motion
- 2) Dorsiflexion to Plantarflexion range of motion

A Tukey post hoc analysis was conducted on all significant findings

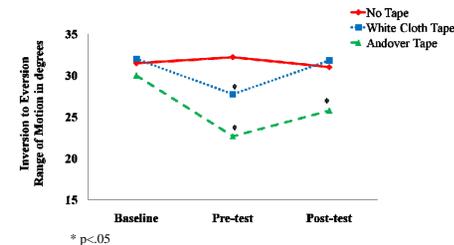
RESULTS

Inversion to Eversion Range of Motion

White cloth tape - A significant decrease between baseline & pre-test

- No significant difference between baseline & post-test

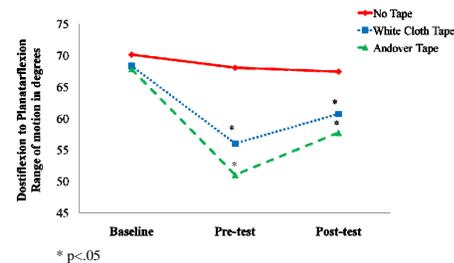
Andover tape - A significant difference between baseline, pre-test, & post-test



Dorsiflexion to Plantarflexion Range of Motion

White cloth tape - A significant difference between baseline, pre-test, & post-test

Andover tape - A significant difference between baseline, pre-test, & post-test



DISCUSSION

The majority of studies agree with our findings that white cloth tape restricts ankle range of motion immediately after tape application (Metcalf, J Athl Train, 1997; Myburgh, Am J Sports Med, 1983). Similarly, Andover PowerTape™/PowerFlex™ also restricts range of motion immediately after application. The difference between the two tape conditions becomes apparent when range of motion is measured after physical activity.

White cloth tape – Inversion to Eversion range of motion

Our study found that white cloth tape lost 99% of its support after 30 minutes of exercise. Therefore, the post-test measurements approached the same inversion to eversion values as the baseline range of motion measurements. Thus, we can conclude that the supporting qualities of white cloth tape were not able to maintain frontal plane ankle joint stability following 30 minutes of exercise.

Andover tape – Inversion to Eversion range of motion

We found that after exercise Andover tape maintained inversion to eversion ankle range of motion restriction. This is drastically different than the findings of the white cloth tape condition. After exercise white cloth tape returned to baseline range of motion, **while the Andover tape condition maintained more than 50% of its original restricted properties.** These findings demonstrate that Andover tape condition maintained frontal plane range of motion restriction better than white cloth tape following 30 minutes of exercise.

White cloth tape & Andover tape – Dorsiflexion to Plantarflexion range of motion

Our findings show that immediately following tape application, both the white cloth tape and Andover tape restricted range of motion. Additionally, after 30 minutes of exercise both tape applications maintained approximately 65% of its original restricted properties in the sagittal plane. Therefore, both tape conditions were successful in restricting the amount of dorsiflexion to plantarflexion range of motion immediately after application and after 30 minutes of exercise.

CONCLUSION

The use of Andover PowerTape™/PowerFlex™ appears to be beneficial when taping the ankle for physical activity. The Andover tape restricts range of motion both before and after exercise. The decreased ankle range of motion in the inversion to eversion direction allows the ankle to maintain a more neutral position thereby reducing the stresses placed on the joint, which ultimately can assist in reducing the chance of an ankle injuries. Even with perspiration in the lower leg with physical activity, the Andover products maintain conformity to the joint and remains a good ankle stabilizer.