The Effect of Kinesio® Tape on Shoulder Joint Range of Motion and Strength

J.H. Obregon, C.M. Hearon FACSM, A. Ilse, and M.L. Daniel

Human Performance Laboratory, Department of Health & Kinesiology

Texas A&M University – Kingsville, Kingsville, TX

ABSTRACT

While research has been conducted to examine the effects of Kinesio® Tape as a treatment modality and as a preventative measure for injury, little research has been conducted regarding the potential ergogenic effects of Kinesio® Tape on healthy, uninjured shoulders. More specifically, the effect of Kinesio® Tape on healthy shoulders has not been investigated thoroughly in regards to range of motion and strength. **PURPOSE**: To examine the effect of Kinesio® Tape on joint range of motion and strength in healthy, uninjured shoulders. **METHODS:** Twelve male subjects were recruited ranging from 19-29 years of age. Only subjects classified as having no prior shoulder injury were allowed to participate. Subjects were allowed 3 familiarity trials for goniometry (5 tests) and the isometric strength test prior to exerciser testing. All subjects underwent three experimental trials [Kinesio® Tape treatment (KNT), placebo tape treatment (PLT), and a no tape control (CON)] during a single testing session using a double blind balanced cross-over design. During the treatment trials, the subjects were blindfolded and taped with either KNT or PLT on both shoulders and upper back. Each experimental trial was comprised of a test for shoulder/upper back isometric strength, and 5 tests for preferred shoulder joint range of motion via goniometry. Differences in shoulder/back strength (kg) and joint range of motion (°) across the three experimental trials (KNT, PLT, CON) were analyzed using an ANOVA with repeated measures, α=0.05. *Post-hoc* tests were used to make all pairwise comparisons for specific differences between the three experimental trials while maintaining the overall error rate at 0.05. **RESULTS:** Shoulder isometric strength did not differ significantly (p>0.05) between the treatments (KNT=65.2±14.1 kg, PLT=65.7±17.3 kg, CON=66.6±19.8 kg). Shoulder horizontal adduction did differ between the treatments (p<0.05) where KNT (120.9±8.5˚) > CON (117.3±7.8˚), but neither was significantly different from PLC (119.6±9.5˚). The treatments also differed significantly (p<0.05) in horizontal abduction, where KNT (44.3±9.5˚) > PLT (40.7±7.6˚), but neither were significantly different from CON (43.0±9.2˚). Shoulder abduction, flexion, and extension did not differ significantly between the treatments (p>0.05). **CONCLUSION:** While Kinesio® Tape had no effect on shoulder/upper back isometric strength, abduction, flexion or extension, KNT did appear to have an effect on motion through the horizontal plane. However, the present sample size appears to have been inadequate to detect specific differences between KNT and both PLC and CON for both horizontal adduction and horizontal abduction.

INTRODUCTION

Kinesio® Tape, created by Kenzo Kase in 1996, is a thin elastic tape theorized to have several benefits, depending on the amount of stretch applied during the application process (1). These benefits promote edema reduction, pain control, increased joint range of motion, and increased muscle strength (1). By lifting the skin over the treatment area, interstitial space is increased which is the mechanism hypothesized to increase blood and lymphatic circulation and increase joint mobility (2). While research has been conducted to examine the effects of Kinesio® Tape as a treatment modality and as a preventative measure for injury (3), little research has been conducted regarding the effects of Kinesio® Tape on healthy, uninjured shoulders. More specifically, the effect of Kinesio® Tape on healthy shoulders has not been investigated thoroughly in regards to range of motion and strength. The expected degree of movement for an uninjured shoulder is: flexion=180°; abduction=180°; horizontal abduction=45° (4), horizontal adduction= 135°; extension=60° (5), (hyperextension may be present up to 80°) (6). Studies suggest that taping may increase muscle strength by neurofacilitation (7). There has been research conducted on the effects of Kinesio® Tape on the anterior knee and thigh, but the results were inconclusive and no relationship was found between Kinesio® Tape and increased muscle strength (1). Furthermore, there is no evidence found supporting the theory that muscle strength is affected by the application of Kinesio® Tape on the shoulder joint.

PURPOSE

The purpose of the study was to examine the effect of Kinesio® Tape on shoulder joint range of motion and strength in healthy, uninjured shoulders.

METHODS

IRB Approval: The study was approved by the Institutional Review Board (Human Subjects) at Texas A&M University-Kingsville.

Subjects: All subjects were provided informed consent prior to testing. Twelve male subjects (N=12), all with uninjured shoulders, were recruited from the student population at Texas A&M University-Kingsville.

Pre-participation Screening/Testing: All subjects underwent a health screening according to the American College of Sports Medicine's guidelines for exercise testing and prescription. Only subjects classified as low or moderate risk for untoward events during exercise, based on these guidelines, were allowed to participate. Additionally, only subjects classified as having no prior shoulder injury were allowed to participate in the study regardless of their current functional status. The following measurements were made pre-exercise testing: body mass utilizing a standard physician's scale and body stature utilizing a stadiometer. Subjects were introduced to the experimental strategies and tests, which included goniometry (5 tests) and the isometric strength test. The subjects were allowed 3 practice repetitions on each test.

Experimental Design: A double blind balanced cross-over design was used. Each subject underwent three experimental trials [Kinesio® Tape treatment (KNT), placebo tape treatment (PLT), and a no tape control (CON)] during a single testing session. During the two treatment trials, the subjects were be taped with either Kinesio® or placebo tape (i.e., standard athletic tape) on both shoulders and their upper back. For each experimental trial the following measurements were made: shoulder/upper back strength, and preferred shoulder joint range of motion (5 measurements = horizontal adduction, horizontal abduction, abduction, flexion and extension).

METHODS, cont.

Measurements:

Shoulder/Upper Back Strength- An isometric force recording apparatus comprised of a platform, chain, hand bar, and electronic load cell with a digital recorder was used to measure shoulder and upper back strength. The subjects were required to engage in a 3 second maximal voluntary isometric contraction using a shoulder lift motion (shoulder shrug). The maximal external force produced was recorded (kg). Subjects performed three repetitions of this test for each experimental trial and the greatest force production out of the three repetitions was used for data analysis.

Shoulder Joint Range of Motion- Goniometry was used to assess the range of motion of the preferred shoulder joint. With the use of a goniometer (Baseline Medical, Fishers, IN), shoulder horizontal adduction, horizontal abduction, abduction, flexion, and extension were measured in degrees (°).

Statistical Analysis: Differences in shoulder/back strength (kg) and range of motion (°) across the three experimental trials (KNT, PLT, CON) were analyzed using an analysis of variance with repeated measures. If needed, appropriate *post-hoc* tests were used to make all pairwise comparisons for specific differences between the three experimental trials. The experimentwise error rate (α=0.05) was maintained throughout all *post-hoc* tests for specific differences.

RESULTS

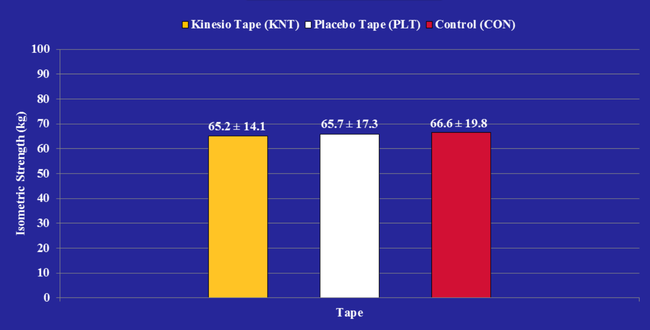

Figure 1: Tape effect on shoulder/upper back isometric strength. Isometric strength did not differ significantly between the treatments (p>0.05).

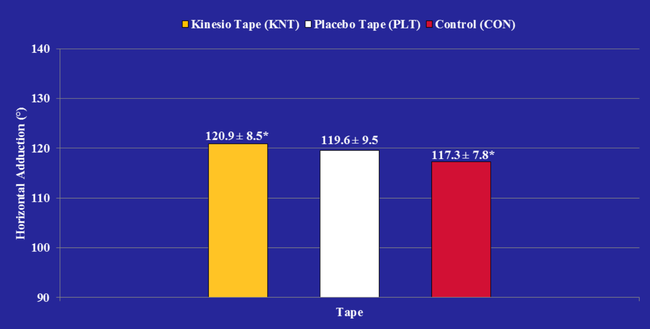

Figure 2: Tape effect on shoulder horizontal adduction. Range of motion differed significantly between the treatments, specifically between KNT and CON (*p<0.05).

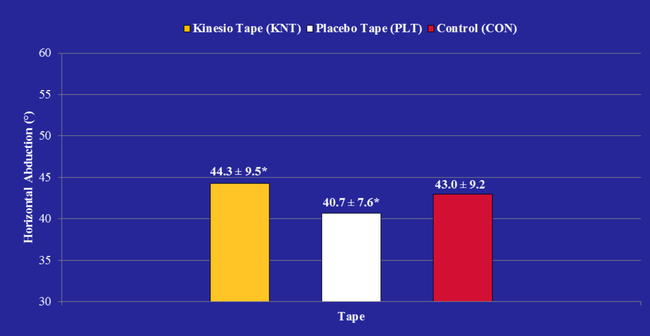

Figure 3: Tape effect on shoulder horizontal abduction. Range of motion differed significantly between the treatments, specifically between KNT and PLT (*p<0.05).

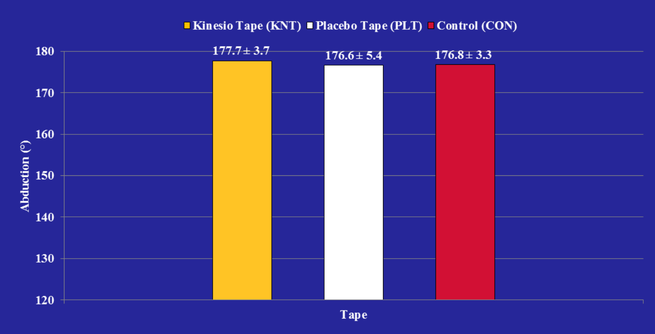

Figure 4: Tape effect on shoulder abduction. Range of motion did not differ significantly between the treatments (p>0.05).

RESULTS, cont.

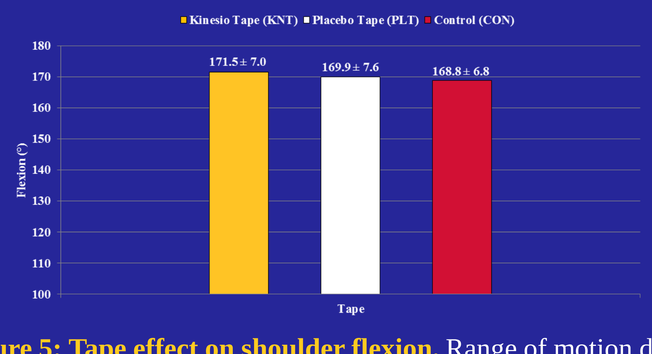

Figure 5: Tape effect on shoulder flexion. Range of motion did not differ significantly between the treatments (p>0.05).

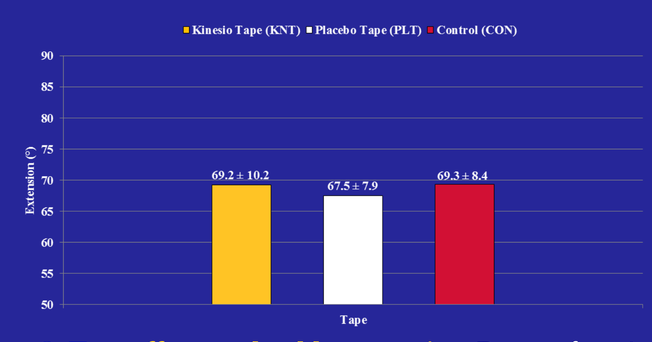

Figure 6: Tape effect on shoulder extension. Range of motion did not differ significantly between the treatments (p>0.05).

CONCLUSIONS

Kinesio® Tape is typically used as a treatment modality and preventative measure for injury in many rehabilitation and wellness settings. However, research regarding the effects of Kinesio® Tape as an ergogenic aide is limited, particularly with regard to shoulder joint range of motion and strength. The results of this study suggests that Kinesio® Tape had no effect on healthy shoulder isometric strength, adduction, abduction, flexion or extension. However, it appears to have had some degree of effect on horizontal adduction and horizontal abduction. It is unclear why this effect was observed in the horizontal plane, but is clearly not present in the rest of the variables. That is, is the effect seen through the horizontal plane demonstrated here an aberration, or was the sample size insufficient to adequately assess differences in the other variables. Further investigation using larger sample sizes is warranted to examine the effects of Kinesio® Tape on healthy joint range of motion, especially in the horizontal plane. Additionally, there are other recommended Kinesio® Tape application techniques, and those should be employed along with the one employed in this study.

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