Research

The Impact of Kinesiology Tape Over the Posterior Lower Limb on Runner Fatigue

John Ward, DC, MA, MS\textsuperscript{1*}, Kenneth Sorrels, DC\textsuperscript{2}, Jesse Coats, DC, BS, DAAPM\textsuperscript{3}, Pourmoghaddam Amir, PhD\textsuperscript{4}, Tiffany Sarmiento, BS\textsuperscript{5}, Carlos DeLeon, BS\textsuperscript{6}, JoAnn Moskop, BS\textsuperscript{7}

Address: \textsuperscript{1}Associate Professor/Research Fellow, Department of Physiology and Chemistry, Texas Chiropractic College, Pasadena, TX, USA, \textsuperscript{2}Professor, Texas Chiropractic College, Pasadena, TX, USA, \textsuperscript{3}Professor Chairman, Department of Clinical Specialties, Texas Chiropractic College, Pasadena, TX, USA, \textsuperscript{4}Researcher, Memorial Bone & Joint Clinic, Houston, TX, USA, \textsuperscript{5}Graduate Student Assistant, Texas Chiropractic College, Pasadena, TX, USA, \textsuperscript{6}Graduate Student Assistant, Texas Chiropractic College, Pasadena, TX, USA, \textsuperscript{7}Graduate Student Assistant, Texas Chiropractic College, Pasadena, TX, USA.

E-mail: John Ward, DC, MA, MS – Jward@txchiro.edu

*Corresponding author

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Abstract

Purpose: The purpose of this study was to determine if placing kinesiology tape on the posterior lower limbs helps preserve runner gait in a fatigued state. The hypothesis was that the elastic properties of the tape may help the runners push off with each step.

Methods: Sixty healthy participants (age= 26.7 + 4.3 yrs, height= 1.72 + 0.09 m, body mass= 75.4 + 17.0 kg: mean ± SD) engaged in a baseline 90-second running gait analysis at 6 mph without kinesiology tape. Participants then completed an Åstrand cycle ergometer maximal test until they reached maximal volitional exhaustion and had over 8 mmol/l blood lactate, which correlates with maximal to near maximal exercise effort. Following this, participants were randomized to one of two interventions: 1) Intervention, which had kinesiology tape placed on the back of the lower limbs bilaterally from their gluteal fold to their heel under tension or 2) Control, no-tape group. All participants then engaged in a running gait analysis in a fatigued state at 6 mph. Researchers used a 2-way repeated measures analysis of variance considering fatigue (pre-fatigue, post-fatigue) and group (tape, no-tape) as subject factors.
Results: There were no statistically significant within-group differences amongst the groups. However, in fatigued runners kinesiology tape placed on the back of the lower limbs was shown to decrease hip functional range of motion, step length, and stride length bilaterally more than participants who did not receive kinesiology tape.

Conclusions: Preliminarily this suggests kinesiology tape placed exclusively on the back of the lower limbs of a fatigued runner will alter and potentially impair running gait by reducing stride length at submaximal running intensities.

Introduction

Fatigue occurs with strenuous physical exertion.\(^1\)\(^-\)\(^3\) Physiological fatigue can be caused by central and peripheral mechanisms, with peripheral mechanisms being more critical in motivated athletes.\(^ 3\) Four sites that have been shown to be most involved in peripheral fatigue development, particularly for motivated athletes, are impairment of metabolic energy supply, contractile mechanisms, excitation-contraction (EC) coupling, and sarcolemma excitability.\(^4\)\(^-\)\(^10\)

Despite the cause of fatigue, athletes must still perform at a high level and try to win in their respective sports during competition. Any ergogenic aid that can safely improve athlete performance in a fatigued state should be explored to maximize human performance. Ergogenics can be subdivided into nutritional aids, psychological aids, pharmacological aids, and mechanical aids (e.g., kinesiology tape).

Kinesiology taping is a relatively new supportive aid that has been used by many athletes internationally. One popular brand is Rocktape\(^\circledR\). The four main claims of Rocktape\(^\circledR\) are that it: increases kinesthetic awareness through cutaneous afferent stimulation, reduces pain by relieving pressure on pain receptors due to the tape’s ability to lift the epidermis, improves fluid dynamics which reduces edema, and improves the athletes’ form.\(^11\) Most of these claims have not been validated through experimentation.

Three systematic reviews have demonstrated there is a lack of high-quality evidence that kinesiology taping can be used to treat musculoskeletal conditions.\(^12\)\(^-\)\(^14\) Few kinesiology taping studies focusing specifically on athletes with musculoskeletal injuries have been generated.\(^15\)\(^-\)\(^18\) Studies focused on the capability of kinesiology taping to act as an ergogenic and improve athletic performance are also limited\(^19\)\(^-\)\(^21\) and thus further research is warranted. Two review articles found that conclusive evidence did not exist to support the use of kinesiology tape to improve athletic performance,\(^22\)\(^-\)\(^23\) but that kinesiology taping did not cause any negative effects on performance.\(^23\) Williams et al\(^23\) further went on to point out that there were some small, but interesting case studies supporting the use of kinesiology taping for athletes; however, due to the possibility of bias, larger more well controlled studies are needed on this topic.

The purpose of this study was to determine if kinesiology tape placed on the posterior lower limbs bilaterally was able to help preserve running gait amongst fatigued runners.
Methods

This study was reviewed and approved by the Texas Chiropractic College Institutional Review Board for human subjects at the sponsoring university in accordance with the Declaration of Helsinki. All subjects were provided a written and oral explanation of the study procedures prior to participation.

Study Design and Setting

This was a single-blind, randomized, controlled study of the immediate impact that kinesiology tape had on helping preserve runner gait in a fatigued state. Specific aims were to determine if kinesiology taping improved lower limb kinematics when participants ran in a fatigued state. The study’s hypothesis was that placing kinesiology tape on the posterior lower limbs may act as a “rubber band” and help participants push off with each step.

As shown in Figure 1, sixty participants were involved in this study. Participants underwent baseline testing of their gait at 6 mph. This was followed by an Åstrand cycle ergometer maximal test. Next participants were randomized to 1) Intervention, which had Rocktape® placed on the back of the lower limbs bilaterally from their buttocks to their heel or 2) Control, no-tape group. Study participants then engaged in another running gait assessment in a fatigued state at 6 mph. The treadmill velocity of 6 mph was arbitrarily chosen as a challenging velocity that most college students could run after an exhaustive test. All testing took place in a research laboratory with an ambient temperature at approximately 74°F and no music was allowed during testing.

Fig 1. Experimental design.
Participants

Asymptomatic college students and volunteers were recruited for this study. All study applicants provided an informed written consent on college-approved documents. They were then screened against inclusion and exclusion criteria. A convenience sample of sixty apparently healthy individuals that met the inclusion/exclusion criteria participated in this study (Table 1).

Table 1. Baseline study participant attributes.

<table>
<thead>
<tr>
<th></th>
<th>Rocktape® group</th>
<th>No tape group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Experimental group)</td>
<td>(Control group)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Females</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Age (y)</td>
<td>27.1 ± 5.0</td>
<td>26.3 ± 3.5</td>
</tr>
<tr>
<td>Body Mass (kg)</td>
<td>73.2 ± 13.2</td>
<td>77.5 ± 20.7</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.71 ± 0.07</td>
<td>1.72 ± 0.10</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>24.9 ± 3.6</td>
<td>25.7 ± 4.5</td>
</tr>
</tbody>
</table>

Data listed as mean ± SD.

Inclusion/exclusion criteria

Inclusion criteria were 1) they reported no contraindication to running or cycling, 2) between the ages of 18-45, 3) answering “no” to all exercise contraindication sections on a Physical Activity Readiness Questionnaire (PAR-Q)²⁴ and 4) they provided their informed written consent. Study participants with any of the following were excluded from the study: 1) any surgery in the past year, 2) any broken bones in the past year, 3) reported neurologic conditions (multiple sclerosis, myasthenia gravis, diabetes, etc.), 4) reported cardiopulmonary conditions (asthma, congestive heart failure, emphysema, etc.), 5) pregnancy, 6) rheumatoid arthritis, 7) Down’s syndrome, 8) known anemia, 9) kidney pathology, and 10) daily pain they rated greater than a 3 on a 1-10 Numeric Rating Scale (NRS).
Randomization and blinding

A computer-generated randomized intervention list was created before the study began. That list determined if a participant would be assigned to either study group (experimental vs control). The biomechanics researcher who analyzed the motion capture data was blinded as to group designation. He was only told that he would be provided with kinematic data from two distinct study groups and that he needed to determine if any unique differences existed between any of the groups’ pre versus post data.

Baseline Preparation and kinematic recording

Trained research assistants placed 18 silver 19 mm MoCap solutions (MoCap solutions, Huntington Beach, CA, USA) reflective markers on the participant’s lower body using double-sided marker fixing tape and surgical tape. Reflective markers were placed on the following anatomic landmarks during this study bilaterally: anterior superior iliac spine, posterior superior iliac spine, greater trochanter of the femur, lateral epicondyle of the femur, tibial tuberosity, lateral malleolus, posterior calcaneus, top of the fifth metatarsal head, and top of the first metatarsal head (figure 2), with a marker set and model as described by Robertson et al.25
Fig 2. Illustration of a study participant and a sample computer model based on reflective marker data extraction using the Vicon® imaging system. Only the left side of the participant’s visible markers are labeled to avoid image clutter.

Prior to the participant arriving at the lab each day the Vicon® system (Vicon, Centennial, CO, USA) was calibrated as suggested by the manufacturer. Participants were assigned black New Balance® running shoes for the jogging gait analysis portion of the research study from several sized shoes purchased before the study began. Any reflective markings on the shoes were spray-painted black. All males wore MX409 New Balance® shoes and women wore WL574 New Balance® shoes (New Balance, Brighton, MA, USA). Once the participant was dressed properly in non-reflective clothing and all of the reflective silver markers were in place they stood on top of the 400 Pro series Keys® treadmill (Keys Fitness Products, Inc., Dallas, TX, USA) for their baseline 10-second computer calibration model generation. Next the participant was instructed that they would be jogging at 6 mph for 90 seconds. A research assistant started the treadmill at the same time as another researcher began recording data with the Vicon® system. The lab’s Vicon® MX system consisted of 8 infrared Bonita 0.3 megapixel cameras. Kinematic data were recorded at 100 Hz. The displacement of the 18 silver reflective markers over time was
recorded. At the conclusion of the data capture session the researcher operating the Vicon® computer stopped the recording and then the treadmill was stopped. The study participant was not given any indication of when the treadmill would be stopped prior to the examiner finishing his computer data recording. Immediately after the 90-second recording was made the initial 15 seconds of the gait trial was clipped from the data to remove any initial steps as the participant became acclimated to the treadmill velocity.

Research assistants then helped the participant take off their lab issued shoes with reflective markers still attached, and set them aside until their post-intervention jogging gait analysis. For the cycle ergometer fatigue test, participants wore their own tennis shoes. The cycle test started approximately 1-minute after the baseline treadmill test. Also prior to the cycle ergometer fatigue test, the tibial tuberosity and anterior superior iliac spine reflective markers were removed from participants since immediately after the cycle ergometer test they would be lying face down. Before being removed, pen marks were made around the base of those four markers to increase the likelihood that research assistants would be able to place them back as close as possible.

Fatigue protocol

The fatigue protocol used in this study consisted of having participants engage in an Åstrand cycle ergometer maximal test as described by Heyward until they reached volitional exhaustion and had over 8 mmol/l blood lactate, which correlates with maximal to near maximal exercise effort. Each stage of the exercise test was 2 minutes long. Participants engaged in the cycle ergometer test on the Ergomedic 828E Monark cycle ergometer (Monark, Alere, Norway). A cycle ergometer was chosen as the instrument to induce fatigue because it was more likely a foreign form of exercise for most participants in relation to their daily life and thus would induce fatigue quickly. Males began pedaling at 2 kiloponds of resistance at 50 rpm. Resistance was increased in 1 kilopond units at the completion of each 2-min stage, as per test protocol. Females began the test at 1 kilopond resistance at 50 rpm. Their resistance was increased in 0.5 kilopond units at the completion of each 2-min stage, as per test protocol. At the end of each stage of the test, participant’s heart rate and rating of perceived exertion (RPE) were recorded. Participants wore a RS 300X SD Polar heart rate monitor chest strap (Polar Electro Inc., Lake Success, NY, USA) during the cycle ergometer test. Participants were vocally encouraged to exercise to maximal exhaustion by assistants that were blinded as to which intervention the participant would receive after their cycle ergometer fatigue protocol. The graded exercise test (GXT) was concluded when the participant could no longer maintain 50 rpm for 3 seconds straight. Upon test completion blood lactate was measured from finger prick using the Lactate Plus Blood Lactate monitor (Nova Biomedical, Waltham, MA, USA) and test strips.

Taping protocol

During taping, participants were prone as illustrated in figure 3. They were instructed to turn their head to the left instead of keeping their face straight down in the face rest of the Ergostyle ES2000 (Pivotal Health Solutions, Watertown, SD, USA) patient table. This was done to reduce the chance of participants feeling light-headed by rebreathing their expired air in their exhausted state. Researchers used disposable paper towels to wipe sweat from the back of the lower limbs of participants to ensure the elastic tape would be more likely to adhere. Rocktape® was placed on the back of both of their lower limbs from the inferior aspect of their calcaneus to their gluteal fold as shown in figure 3. Tape was stretched to approximately 120% of its initial resting length. It took approximately 3 minutes from
the time that the cycle test was completed until tape was placed on participants’ lower limbs and they began the post-intervention treadmill analysis. Participants then immediately engaged in the post-intervention running gait analysis using procedures already discussed.
**Fig 3.** Illustration of how the posterior lower limbs were taped bilaterally from heel to inferior gluteal fold.
Kinematic post-data processing

The data were processed using a customized Matlab script (Mathworks, USA R2007a). The kinematic data were analyzed to calculate characteristics of movement for each participant. In the current study researchers investigated the changes in the functional active range of motion of the hip angle, knee angle, and ankle angle as a result of the intervention. In addition, stance time, percent stance time (duration one foot was on the ground in relation to the gait cycle), step length, and stride length bilaterally were calculated. Right and left limb individual data were then merged for statistical analysis.

Approximate Entropy (ApEn), a measure of gait variability, was additionally determined for each joint. In healthy individuals there is a certain amount of acceptable variability that represents a normal (healthy) gait pattern. However, highly variable gait patterns are typically indicative of some type of pathology or loss of coordination, which may render a person at risk for falling. Values near “0” represent a stable gait, while values near “2” represent a very unstable gait.

Statistical analysis

To analyze the kinematic data, researchers used a 2-way repeated-measures analysis of variance (ANOVA) considering fatigue (prefatigue, postfatigue) and group (tape, no-tape) as subject factors. The Mauchly test was applied to check the sphericity assumption of the repeated-measures ANOVA, and the Greenhouse-Geisser correction was used during instances of sphericity violation. A Bonferroni post hoc test was conducted on statistically significant data among all ANOVAs to determine which condition was significant. The a level of p < 0.05 was considered statistically significant for all tests. Between-groups fatigue protocol data (highest resistance level completed, heart rate, RPE, and blood lactate) were compared using an independent-samples t-test (tape, no-tape). The Levene test for equality of variance was used and followed for homogeneity of variance violation. The data were analyzed using SPSS 20.0 (IBM, Armonk, NY).
Results

Table 2 illustrates the grouped attributes of participants after their last successfully completed level of the fatigue protocol. Participants randomized to the Rocktape® group demonstrated a statistically significant higher end blood lactate level compared to that of the control group (p = 0.013). This fact may even explain some of the decreased performance findings of this Rocktape® group during the post-intervention analysis. Having increased lactic acid in the bloodstream is associated with reduced muscle performance.

Table 2. Cycle ergometer test results using data from the last successfully completed stage of the exhaustive cycle ergometer fatigue protocol.

<table>
<thead>
<tr>
<th></th>
<th>Kinesiology tape group (Experimental group)</th>
<th>No-tape group (Control group)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest resistance level completed (kp)</td>
<td>3.7 ± 1.2</td>
<td>3.4 ± 1.2</td>
<td>0.424</td>
</tr>
<tr>
<td>Heart rate (bpm) at last completed level</td>
<td>175.6 ± 17.4</td>
<td>178.1 ± 14.9</td>
<td>0.593</td>
</tr>
<tr>
<td>Highest reported RPE at last completed level</td>
<td>16.7 ± 2.6</td>
<td>17.0 ± 2.0</td>
<td>0.679</td>
</tr>
<tr>
<td>End blood lactate (mmol/L)</td>
<td>16.5 ± 3.7</td>
<td>14.1 ± 3.1</td>
<td>*0.013</td>
</tr>
</tbody>
</table>

An independent samples t-test was utilized to compare between-group data.

Data listed as mean ± SD.

*= statistically significant.

For the post-intervention analysis the Rocktape® group demonstrated reduced hip functional range of motion, step length and stride length in relation to the no-tape control group. Participants in the tape group had their average hip functional range of motion decreased by 6.1° for their hips. The no-tape control group also had their average hip functional range of motion decrease, but not by nearly as much with a decrease of only 2.3°. Similarly participants in the Rocktape® group had their step length decrease by 30.4 mm, compared to 19.4 mm for the no-tape control group on average. Lastly, stride length decreased in the Rocktape® group by 48.8 mm compared to a 24.4 mm decrease for the no-tape control group on average. Due to participants in the Rocktape® group losing approximately 25 mm (25.4 mm = 1 inch) with each gait cycle they had to increase their stride frequency marginally to maintain the 6 mph setting on the treadmill.
### Table 3. Gait attribute data for the Rocktape® and no-tape control group at 6 mph.

**Experimental group (Kinesiology tape group)**

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>Mean Diff</th>
<th>LCI</th>
<th>UCI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HpROM (°)</td>
<td>63.7</td>
<td>6.7</td>
<td>57.6</td>
<td>5.7</td>
<td>-6.1</td>
<td>12.499</td>
</tr>
<tr>
<td>KnROM (°)</td>
<td>87.1</td>
<td>8.8</td>
<td>88.3</td>
<td>11.1</td>
<td>-1.2</td>
<td>4.20</td>
</tr>
<tr>
<td>AnROM (°)</td>
<td>56.5</td>
<td>5.9</td>
<td>53.7</td>
<td>8.2</td>
<td>2.8</td>
<td>6.97</td>
</tr>
<tr>
<td>STSec (s)</td>
<td>0.44</td>
<td>0.03</td>
<td>0.42</td>
<td>0.03</td>
<td>0.02</td>
<td>0.011</td>
</tr>
<tr>
<td>%ST (%)</td>
<td>57.0</td>
<td>0.7</td>
<td>57.0</td>
<td>0.7</td>
<td>0.00</td>
<td>-0.55</td>
</tr>
<tr>
<td>StepLen (mm)</td>
<td>686.0</td>
<td>41.5</td>
<td>655.7</td>
<td>54.8</td>
<td>30.3</td>
<td>-9.50</td>
</tr>
<tr>
<td>StriLen (mm)</td>
<td>1411.4</td>
<td>90.0</td>
<td>1362.6</td>
<td>96.6</td>
<td>48.8</td>
<td>-34.56</td>
</tr>
<tr>
<td>HpApnEn</td>
<td>0.30</td>
<td>0.04</td>
<td>0.30</td>
<td>0.05</td>
<td>0.00</td>
<td>-0.028</td>
</tr>
<tr>
<td>KnApnEn</td>
<td>0.37</td>
<td>0.07</td>
<td>0.34</td>
<td>0.05</td>
<td>0.03</td>
<td>-0.008</td>
</tr>
<tr>
<td>AnApnEn</td>
<td>0.41</td>
<td>0.07</td>
<td>0.36</td>
<td>0.05</td>
<td>0.05</td>
<td>-0.019</td>
</tr>
</tbody>
</table>

**Control group (No-tape group)**

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>Mean Diff</th>
<th>LCI</th>
<th>UCI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HpROM (°)</td>
<td>58.7</td>
<td>4.4</td>
<td>56.4</td>
<td>5.1</td>
<td>2.3</td>
<td>-0.771</td>
</tr>
<tr>
<td>KnROM (°)</td>
<td>85.2</td>
<td>8.1</td>
<td>83.1</td>
<td>12.1</td>
<td>2.1</td>
<td>-4.74</td>
</tr>
<tr>
<td>AnROM (°)</td>
<td>53.8</td>
<td>6.4</td>
<td>52.2</td>
<td>6.3</td>
<td>1.6</td>
<td>-0.39</td>
</tr>
<tr>
<td>STSec (s)</td>
<td>0.41</td>
<td>0.03</td>
<td>0.40</td>
<td>0.03</td>
<td>0.00</td>
<td>-0.002</td>
</tr>
<tr>
<td>%ST (%)</td>
<td>56.2</td>
<td>1.4</td>
<td>56.4</td>
<td>1.3</td>
<td>-0.2</td>
<td>-0.94</td>
</tr>
<tr>
<td>StepLen (mm)</td>
<td>676.4</td>
<td>57.5</td>
<td>657.0</td>
<td>59.6</td>
<td>19.4</td>
<td>-0.61</td>
</tr>
<tr>
<td>StriLen (mm)</td>
<td>1400.7</td>
<td>150.8</td>
<td>1376.3</td>
<td>161.5</td>
<td>24.4</td>
<td>-11.57</td>
</tr>
<tr>
<td>HpApnEn</td>
<td>0.27</td>
<td>0.06</td>
<td>0.25</td>
<td>0.06</td>
<td>0.02</td>
<td>-0.009</td>
</tr>
<tr>
<td>KnApnEn</td>
<td>0.32</td>
<td>0.06</td>
<td>0.31</td>
<td>0.04</td>
<td>0.01</td>
<td>-0.030</td>
</tr>
<tr>
<td>AnApnEn</td>
<td>0.32</td>
<td>0.04</td>
<td>0.32</td>
<td>0.09</td>
<td>0.00</td>
<td>-0.053</td>
</tr>
</tbody>
</table>

HpROM = hip functional range of motion in degrees; KnROM = knee functional range of motion in degrees; AnROM = ankle functional range of motion in degrees; STSec = stance time in seconds; %ST = stance percentage of gait cycle; StepLen = step length in millimeters (25.4 mm = 1 inch); StriLen = stride length in millimeters; HpApnEn = hip approximate entropy; KnApnEn = knee approximate entropy; AnApnEn = ankle approximate entropy; LCI = lower 95% confidence interval in relation to mean difference; UCI = upper 95% confidence interval in relation to mean difference.

* = statistically significant data.
Discussion

Existing data supports a use for kinesiology taping in reducing edema and regional swelling; however, there is limited evidence to substantiate its positive impact on various musculoskeletal conditions or its ability to act as an ergogenic.

The hypothesis of this study was that kinesiology tape would act like a “rubber band” when placed on the posterior aspect of the lower limbs and this would help improve runner performance in a fatigued state. Ultimately, data from this study suggests putting kinesiology tape on the posterior aspect of participants’ lower limbs exclusively when they are in a fatigued state decreases their step length, stride length, and hip functional range of motion greater than what would naturally occur due to fatigue. If this occurs it may decrease runner performance because they will not be able to reach out as far as they normally would with their lower limbs while running. Long stride length is associated with faster runner performance in sustained running activities and is seen as one of the easiest gait factors that can be manipulated to improve runner performance.

However, at faster velocities, as seen in sprinting research, stride frequency becomes more critical to overall performance. In the present study Rocktape® did increase stride frequency slightly, but at the cost of stride length. Since this was a submaximal velocity study it is unclear how posterior lower limb taping would impact sprint velocity, in relation to the marginal increase in stride frequency.

Additionally, due to the findings of this study a new question has arisen. What is the optimal taping pattern to improve runner performance since research on this specific topic is lacking? Comparative studies of different lower limb taping patterns under submaximal sustained running and sprinting should be performed to determine if utilizing kinesiology tape provides any significant benefit to performance. Another jogging gait study performed by our lab, with a similar methodology, involved taping the anterior aspect of runners’ lower limbs bilaterally from their upper thigh to just below their patella using Rocktape®. The results from that study demonstrated that applying kinesiology tape, under traction, to the anterior aspect of the lower limbs preserved step length and stride length, contrary to this study’s findings. The reason why this occurred is unclear. One possible hypothesis is that by tractioning the knee upwards with kinesiology tape it may make it easier for a fatigued runner to reach forward with each step. Further comparative taping studies are warranted to determine if taping can truly improve performance in a fatigued state.

Limitations

Participants were running on a treadmill at a static velocity and running performance would likely be different than what would occur on uneven ground outdoors as discussed by Kluitenberg et al. However, this likely is not a factor in this comparison study since participants engaged in the pre-test and post-test both on a treadmill.

Participants in the present study were reasonably healthy college students. The impact supportive Rocktape® would have on patients with various lower limb musculoskeletal conditions (e.g., shin splints, plantar fasciitis) during a similar study remains unclear.

Researchers were not able to measure the exact amount of tension in the kinesiology tape that was applied to participants’ lower limbs. The researcher taping participants attempted to stretch the tape to
120% of its resting length as he applied it to the back of participant’s lower limbs. It is reasonable that varying levels of tension could have been applied to different participants in this study. However, this is likely what would occur in a real-world scenario and thus this study still provides practical information.

There is not a clear standardized taping technique to improve runner performance. As a result, this study’s researchers used an explorative design by taping only the posterior aspect of the lower limbs to determine how that would impact runner performance. It is plausible that a different taping pattern could have resulted in a differing outcome.

**Conclusion**

The findings of this experiment were that placing kinesiology tape on the back of the lower limbs reduces hip functional range of motion, step length, and stride length of fatigued runners. The impact this has on gait of fatigued runners under sustained running and sprint conditions needs to be studied further. Due to the limited studies on kinesiology tape further studies are warranted to understand how it may truly impact athletic performance.

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**References**


