

# The effect of kinesio taping on balance control and functional performance in athletes with chronic ankle instability

## Abstract

**Study design:** cross sectional study.

**Background:** Lateral ankle sprain is the most common type of ankle injuries. Repeated injury leads to chronic ankle instability (CAI) that affects balance and functional performance. Many interventions were established to improve balance post ankle sprains and CAI. A new preventive measure is using the Kinesio tape (KT) which has been used for ankle joint in various conditions for different purposes such as reducing pain, swelling, and speed recovery for some musculoskeletal problems. Yet, use of the KT to improve balance is not well covered.

**Objectives:** To investigate the effect of KT on balance control and functional performance in Athletes with CAI.

**Methods:** Thirty male athlete patients with unilateral CAI that resulted from lateral ankle sprain were recruited. Balance and functional performance were assessed both feet for two conditions; with tape and without tape. Test conditions were repeated with eyes-open and closed, testing affected and sound ankles, and performed in stable and foam surfaces

**Results:** Taping main effects showed significantly longer time to loss balance (TTLOB) in tape compared to no tape condition ( $P=0.012$ ). The interaction between taping condition and tested leg showed significantly longer TTLOB with tape compared to no tape was detected when testing the affected leg ( $P=0.001$ ). Moreover, the interaction between taping condition and eye condition showed significantly longer TTLOB with tape compared to no tape condition in both eyes conditions. Similarly, The interaction between taping conditions and surface conditions showed significantly longer TTLOB was detected with tape application mean compared to no tape condition when testing on foam surface ( $p=0.003$ ). The taping showed significantly longer single leg hop distance compared to no tape condition ( $P=0.011$ ).

**Conclusion:** Kinesio tape tends to be an effective approach to improve balance and functional performance in case of chronic ankle instability.

**Keywords:** chronic ankle instability, balance, functional performance, kienstio tape, Airex pad, single hop test

**Abbreviations:** CAI, chronic ankle instability; KT, Kinesio tape, TTB, time to boundary, COP, center of pressure; BESS, Using balance errors scoring system, SEBT, star excursion balance testFAI, functional ankle instability; ABT, the ankle balance taping, VGRF, vertical ground reaction force, TTLOB, Time to loss of balance, EO, Eyes open, EC, Eyes closed, JPS, joint position sense

## Introduction

Ankle injuries are considered the second most common sustained injuries in athletes following knee injuries. Ankle sprain is the most common form of ankle injuries sustained in sports participation.<sup>1</sup> A large percent of ankle sprains, that reaches 70-80% in athletes, are recurrent with consequent chronic ankle instability (CAI).<sup>2-4</sup> CAI is defined as the susceptibility of the ankle to giving way during activity, with or without mechanical instability.<sup>5</sup> Hertel<sup>6</sup> suggested a paradigm of insufficiencies including both mechanical and functional factors forming a continuum that may result in CAI. Mechanically, this includes pathologic ligaments laxity, arthrokinematic restrictions, degenerative and synovial changes. While the functional factors

include strength deficits, impaired neuromuscular control and proprioception, and impaired postural control.

The use of traditional white athletic taping in ankle taping is still widely used by athletes, trainers, and sports physicians. However, a new generation of therapy that was developed by Dr. Kenzo Kase<sup>7</sup> In 1973 named Kinesio tape, or kinesiology tape (KT) is currently applied immediately following injury and during rehabilitation.<sup>7</sup> KT is different from the traditional white athletic taping due to having elastic properties similar to the skin, and being stretchable to 40-60% of its original length.<sup>7,8</sup> Recently, researchers examined the effects KT on managing CAI.<sup>9-12</sup> However, the results are still indecisive, providing controversial evidence of the efficacy of using KT in managing CAI. The variation among these few research works in the topic includes using different KT brands and applications, differences in experimental samples, independent variables and outcomes.

In this study, it has been considered the popular use of KT in athletic population nowadays, makes application of KT in CAI warrants further research to study the effects and provide evidence. This directs the researcher to design the current study applying KT to

athletes with history of CAI. Then to assess the immediate effect of this KT application on athletes balance and function.

## Methods

### Study design

Cross sectional study.

### Settings

This study was conducted in the medical clinic of various sport clubs in Riyadh Region, Saudi Arabia.

### Participants

Thirty male athlete patients with chronic ankle instability (CAI) that resulted from lateral ankle sprain ( $N = 30$ ) were recruited from various sports clubs in the region of Riyadh, Saudi Arabia. Patients' volunteered to participate in the study, where the sample was a sample of convenience. Their age range was 18-40 years. Patients participated in one of the following sports (soccer, basketball and volleyball).

### Sample and sample size calculation

A sample of convenience was invited to participate in this study. Means and standard deviations from a previous comparable study have been used to calculate the sample size for this study.<sup>13</sup> For the sample size calculation, we used the G\*power software. Power is set to 0.80 and  $\alpha$  is set to 0.05. Mean $\pm$ SD:  $(2.53 \pm 2.37)$  and  $(1.29 \pm 1.05)$ . Effect size: (.68). Minimal number of subjects 30.

## Procedures

### Evaluation procedures

The dominant leg was determined by asking participant to kick a ball.<sup>14</sup> Starting the study with taping or without was determined randomly. Each participant had the chance to choose one of two concealed papers, which contained (Tape) and (non-Tape). Each word belonged to either starting with Kinesio taping or not.

### Balance evaluation

Balance was evaluated using time to balance loss using unipedal balance tests on stable and unstable surfaces.<sup>15</sup> All tests on unstable surface were done by using a foam pad (AIREX balance pad).

Assessment was conducted in four conditions for each surface; without tape eye- opened (EO), without tape eye- closed (EC), with tape EO, and with tape EC. Both sound and affected legs were tested (Figure 1).

For both the EC and EO trials, each volunteer was asked to stand on the affected foot with hands on the hips. The maximum time for each test was 180 seconds. This maximum time is based on a study by<sup>16</sup> who reported that only 1% of their subjects (aged 14-24 years) achieved this time on the EC unipedal balance test.

During EO tests the researcher placed a target 4 m front on the level of the eyes for the subject to focus on. Time was stopped if the subject lost his balance. Movements which researcher considered as loss of balance were removing of one hand from the hip, touch the foam or floor by the non-weight-bearing foot, movement of the weight bearing foot from its original position on the foam or floor.

While in the EC tests time was stopped in two conditions, whether the subject lost his balance or opened his eyes.



**Figure 1** Balance test on stable and unstable surfaces

A 30-second rest provided between the tests, and 15-second rest were allowed between the 3 trials of the same test.<sup>15</sup> Each test repeated for 3 trials and the average time to balance loss reported.

### Functional performance test

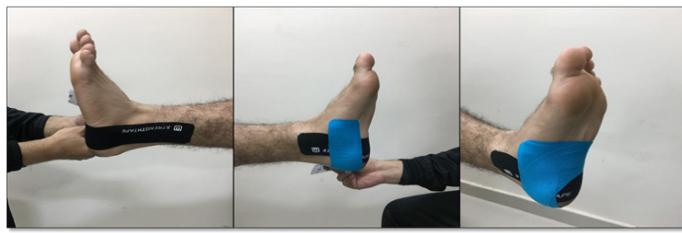
In this study, the functional performance of ankle joint was assessed by using Single hop test. The test carried out on both sound and affected sides with and without taping. In this trial, the volunteer was asked to jump forward as far as possible. The researcher recorded the distance from the toes on the starting line to the end of the jump (Figure 2). Volunteers repeated the trial for 3 times and average distance was calculated and reported. One-minute rest was allowed after each trial to avoid fatigue.



**Figure 2** Single hop test

### Taping procedures

The ankle was taped per the Kinesiology Tape Info Center concept (Expert, 2015) (Figure 3). In each step when the tape is applied, I rubbed the tape from the center toward the ends to activate the adhesive. Then, the tape was allowed a time of 10-15 minutes to be active prior to post- tape evaluation.



**Figure 3** Application of kinesiotape for an ankle sprain according Kinesiology Tape Info Center concept.

## Statistical analysis

All statistical analysis done using SPSS version 23.0. Demographic data of the study participants were reported as mean and standard deviations. The statistical analysis was carried out using repeated measures ANOVA. Mean and standard deviation of TTLOB are reported as descriptive statistics for all test conditions. The main effects of taping on TTLOB were examined. In addition, the interaction effects between tape conditions and each of the other balance test conditions were reported. Repeated measures ANOVA was also used to examine the main effect of tape condition and the tested leg, and the interaction between tape condition and tested leg effects on single hop test. All statistical tests were conducted at  $P < 0.05$ .

## Results

### KT and balance

Participants balance during ankle taping and non-taping conditions were assessed with different combinations of eye conditions (EO/EC), surface stability (stable/unstable surfaces). Both involved and non-involved ankles were tested.

Since taping condition is the main independent variable under study, the main effect of taping condition was introduced. Moreover, analyzes of the interactions of taping condition across each of other conditions were conducted.

Taping condition main effects have showed significantly longer TTLOB in tape mean 31.01 (SE;  $\pm 2.62$ ) compared to no tape condition mean 27.54 (SE;  $\pm 2.58$ ) ( $P=0.012$ ) (Table 1). This means that KT improved balance compared to no tape regardless the other test conditions.

**Table 1** Means, Standard errors (SE), and confidence intervals, F values, significance of the main effects of taping condition on TTLOB.

Tape condition	Mean	SE	95% Confidence interval	
			Lower bound	Upper bound
No Tape	27.54	$\pm 2.58$	22.26	32.81
Tape	31.01	$\pm 2.62$	25.65	36.38
$F_{(1,29)}$	7.15			
Sig.	0.012*			

$P < 0.05$

### Interaction effects between taping and other test conditions

The interaction between taping condition and tested leg showed

non-significant between tape mean 33.8 (SE;  $\pm 2.85$ ) and no tape conditions mean 31.79 (SE;  $\pm 2.93$ ) when testing the sound leg ( $P=0.171$ ). While, significantly longer TTLOB with tape (28.22  $\pm 2.78$ ) compared to no tape mean 23.28 (SE;  $\pm 2.19$ ) was detected when testing the affected leg ( $P=0.001$ ) (Table 2). This indicates that balance of affected leg improved with KT.

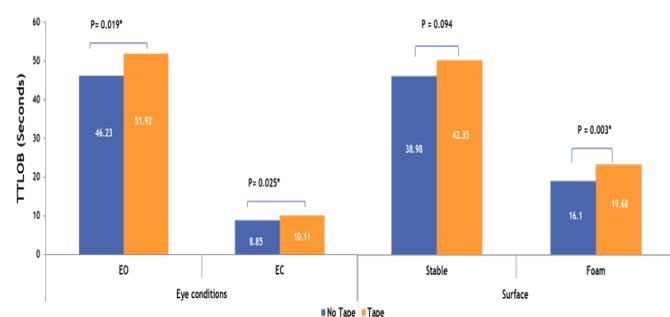
Comparison between no tape condition between the two legs showed significantly longer TTLOB ( $P=0.000$ ) in the sound leg mean 31.79 (SE;  $\pm 2.93$ ) compared to affected leg mean 23.28 (SE;  $\pm 2.19$ ). Likewise, significantly longer TTLOB was reported on testing the sound leg mean 33.8 (SE;  $\pm 2.85$ ) compared to affected leg mean 28.22 (SE;  $\pm 2.78$ ) with tape applied ( $P=0.01$ ) (Table 2).

**Table 2** Comparison of tape versus no tape mean and standard error (SE) TTLOB values in sound and affected legs.

Leg tape condition	Sound		Affected		Statistical testing	
	Mean	SE	Mean	SE	$F_{(1,29)}$	Sig.
Tape	33.8	2.85	28.22	2.78	7.67	0.01*
No tape	31.79	2.93	23.28	2.19	25.04	0.000*
Statistical testing	$F_{(1,29)}$	1.97			12.85	
	Sig.	0.17			0.001*	

\*  $P < 0.05$

The interaction between taping condition and eye condition showed significantly longer mean TTLOB with tape mean 51.92 (SE;  $\pm 4.51$ ) compared to no tape condition mean 46.23 (SE;  $\pm 4.63$ ) in EO condition ( $p=0.019$ ). Similarly, there was significantly longer mean TTLOB with tape mean 10.11 (SE;  $\pm 1.12$ ) compared to no tape condition mean 8.85 (SE;  $\pm 0.96$ ) in EC condition ( $p=0.025$ ) (Figure 4). This result revealed that KT improved balance in both eyes conditions, regardless other test condition.



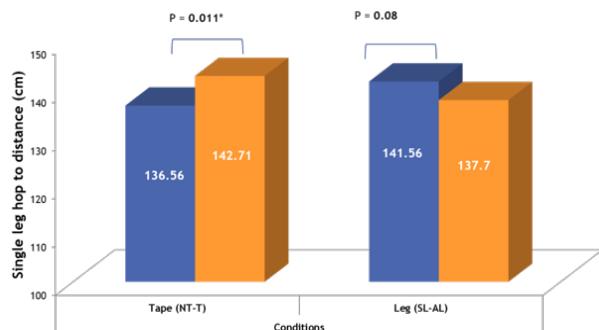
**Figure 4** Comparison between mean TTLOB values with and without tape across different eyes conditions and different surfaces.

The interaction between taping conditions and surface conditions showed non-significantly longer mean TTLOB with tape application mean 42.35 (SE;  $\pm 3.74$ ) compared to no tape condition mean 38.98 (SE;  $\pm 3.75$ ) when testing on stable surface ( $p=0.094$ ). On the contrary, significantly longer TTLOB was detected with tape application mean 19.68 (SE;  $\pm 1.85$ ) compared to no tape condition mean 16.1 (SE;  $\pm 1.75$ ) when testing on foam surface ( $p=0.003$ ) (Figure 4).

These results show that KT did not improve the balance on stable surface, while the improvement showed on foam surface.

## KT and functional performance

Functional testing of the ankle using single hop to distance test was applied. Results of taping condition main effects showed significantly longer single leg hop distance in tape mean 142.71 (SE;  $\pm 3.49$ ) compared to no tape condition mean 136.56 (SE;  $\pm 3.70$ ) ( $P=0.011$ ). That mean KT was improved the functional performance. Concerning tested leg, non-significant longer single hop to distance were reported in testing the sound leg (141.56) compared to the affected leg (137.7) regardless of tape condition ( $P=0.08$ ) (Figure 5).



**Figure 5** Compare means of single leg hop to distance between tape conditions (no tape/tape) and tested legs (sound/affected).

The effect of the tape testing condition based on the tested leg showed significantly longer single leg hop distance with taping mean 144.47 (SE;  $\pm 3.65$ ) compared to no tape condition mean 138.66 (SE;  $\pm 3.69$ ) when the sound leg was tested ( $p=0.013$ ), likewise, there was significantly longer single leg hop distance with taping mean 140.94 (SE;  $\pm 3.67$ ) compared to no tape condition mean 134.46 (SE;  $\pm 4.15$ ) when the affected leg was tested. These result revealed that KT was improved the functional performance in both sound and affected legs.

On the other hand, the single leg hop distance was longer in the sound leg mean 138.66 (SE;  $\pm 3.69$ ) compared to the affected one mean 134.46 (SE;  $\pm 4.15$ ) during no tape condition ( $p=0.115$ ). Moreover the single leg hop distance was longer in the sound leg mean 144.47 (SE;  $\pm 3.65$ ) compared to the affected one mean 140.94 (SE;  $\pm 3.67$ ) with tape condition ( $p=0.111$ ) (Table 3).

**Table 3** Comparison of tape versus no tape mean and standard error (SE) values of single leg hop distance in sound and affected legs.

Leg tape condition	Sound		Affected		Statistical testing	
	Mean	SE	Mean	SE	F <sub>(1,29)</sub>	Sig.
Tape	144.47	3.65	140.94	3.67	2707	0.111
No tape	138.66	3.69	134.46	4.15	2644	0.115
Statistical testing	F <sub>(1,29)</sub>	7.03	5.49			
	Sig.	0.013*	0.026*			

P < 0.05

## Discussion

The current study aimed to assess the effects of KT on balance and functional performance in athletes with CAI in Saudi Arabia. This study revealed that KT improved balance and functional performance

directly after the application, which I suggest, is an advantage especially in sports field.

In this chapter, there will be a presentation of the outcomes, with discussion of related studies. Moreover, it will provide the available and proposed explanation of the outcomes, as well as the consensus and differences between current and previous studies.

## Effect of KT on balance

In the current study, the effect of KT on balance was assessed by using TTLOB as outcome parameter. CAI subjects were evaluated during tape and non tape conditions. Both tape and no tape conditions were tested in combination with several other conditions. This included leg (affected and sound), eye (open versus closed), and surface (stable and foam). The effects of taping on TTLOB were obtained from statistical analysis. Results of the effects of tape condition showed more extended TTLOB with tape compared to no tape condition in the affected ankles. This indicates improved balance in subjects with CAI with KT application.

The suggested explanation for improved balance in subjects suffering from CAI with KT application in this study is likely improved proprioception of the ankle region. This explanation was also given by Seo et al.<sup>17</sup> who examined the effect of KT on joint position sense (JPS) of ankle in dorsiflexion, plantarflexion, inversion, and eversion directions in subjects with ankle sprain. They reported less absolute error in active reproduction tests in dorsiflexion and inversion directions while KT was applied. They suggested that proprioception is enhanced by KT due to stimulation of cutaneous mechanoreceptors. Enhanced proprioception is likely responsible for improved postural control and better response to perturbations.

The current study showed outcomes that agree with Jackson et al.<sup>18</sup> Jackson et al.<sup>18</sup> supported the effect of KT on cutaneous mechanoreceptors, and suggested that the pressure and compression produced by the KT motivates cutaneous mechanoreceptors. Motivation of cutaneous mechanoreceptors enhances the information transfer about joint position and movement, and therefore, enhances proprioception. Jackson et al.<sup>18</sup> aimed at determining the efficiency of KT in reducing the balance deficits that the patients suffer from CAI experience. This problem in the patients with CAI is related to the considerable reduction in neuromuscular control and proprioception. As a result, they assumed it is likely that the ability of KT to enhance proprioception could enhance balance as well. The results of Jackson et al.<sup>18</sup> showed balance improvement in 48 hours after KT application, which remained even in 72 hours later. An interesting point in the study by Jackson et al.<sup>18</sup> is the examination of balance on stable and foam surfaces, and they reported significantly better balance control with foam surface in the KT group. Despite being different in the time of re-assessment, and the outcome measure used for balance assessment, these findings generally agree with the result of current study that showed that the KT significantly improved balance in CAI.

Furthermore, the study of Lee et al.<sup>19</sup> discussed the ankle injury issues; in particular soccer players, who are at risk of damages to their ankles. The study investigated the effects of ankle balance taping (ABT) using KT on balance. Nine young soccer players from male teams who have Functional ankle instability were recruited in the study. The findings showed that the athletes who used ankle balance taping using the Kinesio tape had significant improvement in the balance that was assessed using star excursion balance test (SEBT).

SEBT applied on the ground (stable surface), with eye open condition only. Lee et al.<sup>19</sup> focused their explanation of the results on the effects of KT on stimulation of cutaneous mechanoreceptors, and enhancing proprioceptive function. However, broadly speaking their results agrees with the current study findings in case of balance test on stable surface. The overall results of this study support the current study outcomes despite differences in balance assessment, and difference in sample size. Likewise et al.<sup>20</sup> examined the effect of ABT using KT applied for a 33 years old patient. They examined balance using both SEBT and BESS score. ABT was applied for two consecutive months and balance was reassessed thereafter. It was shown that there was a significant increased to reach distances in the SEBT test, and significant reductions in error scores seen through the BESS test. They shared the same explanation that patient improvement is due to stimulation of mechanoreceptors and, thus, enhanced proprioception.

On the contrary, Hettle<sup>21</sup> investigated the effect of KT on cases of CAI. Sixteen participants (10 female, 6 male) were recruited to this study. Reach distances were measured in antero-medial, medial and postero- medial directions to assess balance by using SEBT. Hettle<sup>21</sup> reported that KT did not increase reach distance in SEBT in active young adult patients. Possible difference between their results and the current study are due to difference in KT brand and application.

In a study completed by Shields et al.<sup>12</sup> examined the impact of KT on postural control deficits in healthy ankles, copers, and CAI patients. The sample consisted of sixty subjects divided into the three groups. The time to boundary (TTB) and center of pressure (COP) were investigated for the frontal and sagittal planes. Testing was performed prior to tape application, immediately after tape application, 24 hours following tape application, and immediately after tape removal. The results showed that there was no clear benefit to postural control following taping of the injured ankle. There was, however, a small benefit evident a day later, which is not a clinically meaningful result. Both the current study and the study by Shields et al.<sup>12</sup> study effects of KT on balance control. The measures of balance control in the current study were more functionally oriented test (TTLOB) to be applied on clinical settings. On the contrary, the balance measures by Shields were from gait and force platform labs. The difference of outcome measures between current study and Shield et al. study caused the difference in results.

Moreover, in contradiction to current study, Bicici et al.<sup>9</sup> researched the impact of KT and athletic tape for participants suffering from chronic ankle sprain. This study examined basketball players with chronic inversion ankle sprains primarily, and balance was evaluated through the Star excursion balance test and the kinesthetic ability trainer (KAT) 3000, where the participants had their eyes open. The results showed that, generally, KT did not have a significant impact on both static and dynamic balance compared to athletic tape, placebo, and no tape conditions. The insignificance effects on balance seen in this study contradict the findings in the current study. The researcher in the current paper used different application of KT, and different brand of KT that is 10% stretcher and 30% stickier than regular kinesiology tape. These differs between the two studies this might have caused the discrepancy in the outcomes.

The results of the current study suggested that there was no significant effects of KT on enhancing balance control when it was applied on the sound ankle. Several studies were conducted to investigate the effect of KT on healthy ankles supported the present results. For instance, research undertaken by Akbari et al.<sup>22</sup> looked

into the impact of ankle taping and balance exercises for postural stability indices in healthy women. Examinations were done using Bidex balance system in three leg conditions (bilateral, right, and left leg stances), and two visual eye conditions (eye opened and eye closed). Results in the KT group in Akbari et al.<sup>22</sup> study were variable according to test conditions and they concluded in their all over assessment of the study outcomes that their results partially supported the positive effect of KT on balance. In the present study there was no effect of KT in enhancing unipedal balance in healthy ankles of the tested subjects. Therefore, results of Akbari et al.<sup>22</sup> partially agreed with the results of the present study. Even when dealing with the subset of stability indices that showed improvement with KT results should be interpreted cautiously. Cautious interpretation of Akbari et al.<sup>22</sup> is due to the inconsistency of the improvements seen in some balance indices in the study leave the positive effects in some stability indices questionable. Akbari et al.<sup>22</sup> had not reported the significance values of the stability indices that improved with KT. In the conclusion Akbari et al.<sup>22</sup> summed up their opinion by reporting that balance training is superior to KT on enhancing balance.

Nakajima et al.<sup>23</sup> examined the effects of KT on vertical jump and dynamic postural control across a sample of 52 healthy young individuals (28 male and 24 female). The results displayed no significant difference in the star excursion balance test in pre- and post-taped tests, which is consistent with the current study where no significant effect was seen when tape and no tape conditions were compared on sound ankle.

The previous studies mostly showed that the significant improvements are seen when the studies involved injured ankle joints but not healthy ones. This supports the outcomes of the current study that the sound ankle showed no significant differences in TTLOB between tape and no tape condition. The insignificant effect of KT can be postulated to be due to the 'normal' balance abilities and proprioceptive function in healthy subjects.

### Effect of KT on functional performance

Significantly longer distance in single leg hop test means better function. Thus, according to the present study results KT significantly enhance function in patients with CAI. In the current paper, Functional performance assessed using single hop test. Outcomes of taping effects showed significantly longer single leg hop distance in tape condition compared with no tape condition.

There are limited studies that assessed the effect of KT on functional performance of the ankle joint in case of CAI. Bicici<sup>9</sup> examined the impact of KT and athletic tape in cases of patients suffering from chronic ankle sprains. This work concentrated on basketball players who suffered from chronic inversion ankle sprains. They conducted four functional performance tests; hopping test, single leg hurdle test, vertical jumping, and standing heel rise test, using varied tape conditions: placebo tape, without tape, standard athletic tape, and KT. The results of this paper showed that KT was significantly better than placebo and no taping in case of single leg hurdle test. Moreover, KT was significantly better than regular athletic taping in vertical jump distance and average standing heel rise counts. These results partially support the current study findings that KT likely improves functional performance in patients with CAI. Although they reported better outcomes with KT than placebo and no taping conditions, the differences were not statistically significant. The discrepancy of results between the previous study and the current one, where there

is reported significant improvement in single leg hop to distance test, is the difference in the application of the hopping test. Bicici et al.<sup>9</sup> used hopping test that consists of leveled squares and 4 squares with a 158 incline in different directions. The participants were ordered to hop around the squares and finish the test as fast and accurately as possible. While the researcher in the current paper used single leg hop test.

Other studies that investigated the effect of KT on functional performance in CAI concentrated on the functional performance tests that examined balance function. These are SEBT,<sup>9,19,21</sup> BESS<sup>18</sup> or both.<sup>20</sup> These studies were discussed in details in the previous section pertinent to balance outcomes.

In contradictory, Schiffer et al.<sup>24</sup> examined how lower extremity taping by KT affected performance in healthy elite female athletes, presenting similar findings. The results showed that KT did not affect jumping distance for elite female athletes across various jumping disciplines. In this study, the researchers recruited only female participants, which meant that the study results could not be generalized, as the immediate response of male and female muscles might differ through KT.<sup>25</sup>

Likewise, Nakajima & Baldridge<sup>23</sup> investigate the impact of KT on dynamic postural control and vertical jump. 52 young healthy participants randomized into the sham KT (n = 25) and real KT (n = 27). The assessment of vertical jump was done with the use of VertiMetric device. The results revealed the effect of KT on the ankle was not significant during vertical jump.

Moreover, Nunes et al.<sup>26</sup> examined the impact of KT on the triceps surae muscle and how it affected jumping and balance in healthy athletes. The outcome was that there was no great change for the measurements mentioned above, and using Kinesio taping in triceps surae muscle did not offer any benefit to jumping and balance performance.

The postulated mechanism by which KT might have enhanced functional performance in the present study is also related to enhanced proprioception. It is postulated in the present study that the capacity of KT to stimulate cutaneous mechanoreceptors would improve proprioception. Improved ankle proprioception might enhance dynamic stability of the joint, therefore enhance functional performance.

The study of Huang et al. investigated the impact of the elastic tape on triceps surae. The study involved 31 healthy adult subjects to do a maximal vertical jump. Two techniques were used, placebo tape and Kinesio tape. According to the results, the application of Kinesio tape caused considerable increase in the medial gastrocnemius muscle EMG activity and vertical ground reaction force in the course of jumping. It should also be noted that the difference in the height of jumping after the application of Kinesio tape was not significant.

The possible explanation for the contradiction of the results in previous studies assessing vertical jumping with our finding is the different in subject's conditions. The previous studies recruited healthy subjects while in the current paper the subject suffering from CAI. Furthermore, the gravity restriction in vertical jumping test might intrude any significant effect of the KT.

## Conclusion

This current study investigated the effect of KT on balance and functional performance in athletes with CAI. The study showed that applying the KT around the ankle is significantly increased TTLOB, compared to no tape condition. This indicates that KT as applied in the current study enhances balance control in athletes with unilateral CAI. Moreover, during functional performance, there was significant increase in single leg hop distance in tape condition compared to no tape condition. This also indicates KT as applied in the current study might play a role in enhancing functional performance in athletes with CAI.

## Acknowledgements

None.

## Conflict of interest

Authors declare there is no conflict of interest in publishing the article.

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