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Efficacy of Kinesio Taping *vs.* Rigid Taping on Hamstring Strain in Athletes

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Abstract

Introduction and background: One of the most frequent injuries among physically active people is a hamstring injury. It has been thoroughly researched how preventive ankle taping and bracing works. Kinesio® Tape (KT) is a relatively new sort of taping technique that is becoming more and more well-liked as a tool for both treatment and performance improvement. There is, however, a dearth of evidence on how KT affects functional performance.

Purpose: There is no gold standard for conservative treatment due to the significant occurrence of a hamstring strain in athletes. Clinicians are using Kinesio taping and athletic taping more frequently to treat hamstring strains. This study's goal is to investigate the effects of Kinesio and athletic taping on vertical jump and dynamic function in hamstring strain patients in a clinical context and to see if the findings from other studies can be confirmed by this one.

Methods: A total of 30 people were chosen based on the inclusion and exclusion criteria and their informed consent was gained after being told how simple and safe the treatment was. The subjects who agreed to participate were split into two groups, GROUP A and GROUP B and informed about the investigation and the proposed intervention before their written agreement was obtained. The vertical jump test and the star excursion balance test were used to measure each individual prior to the post-test, which was administered eight weeks after the pre-test. For six weeks, the members of Group A underwent Kinesio taping with exercises twice a week. The vertical leap test and the Star test were used to review the subjects' hamstring muscular extensibility after two weeks.

Results: The data from the vertical jump test were analysed using a three-way factorial ANOVA with repeated measures on the last factor for both the males and girls in both groups. Overall, it was found that participants with hamstring strains benefited significantly from Kinesio-taping treatment *vs.* rigid taping. However, a statistically significant effect of KT for vertical jump succession resulted from the main effect of KT being tempered by significant gender interaction. Male and female f (1, 40) for the group is 0.390 (P>0.05). Additionally, it is noted that the interaction between group and gender is not statistically different, with f (1, 40) equal to 0.578 (P=0.552).

Since the SEBT F (1, 38) is 3.369 (P>0.05) for SEBT, the study demonstrates an improvement in SEBT for both groups.

Discussion: This study sought to determine how KT affected healthy subjects' dynamic postural control and vertical leaps. Only female participants and the posterior-medial and medial orientations of the SEBT test were subject to the significant effect. Additionally, rather than comparing the pre- and immediate post-time periods, the pre- and 24-hour post-time periods revealed the effects of the improvement in SEBT scores for the two orientations.

Keywords: Kinesio taping • Rigid taping • Hamstring strain • Dynamic exercises • Proprioceptor neuromuscular facilitation

Introduction

The long, strong set of muscles that runs around the back of the leg is known as the hamstrings. The four muscles (semitendinosus, semimembranosus, long and short head of biceps femoris) found in the back of the thigh are referred to as "hamstrings" together. The most frequent diagnosis of hamstring injuries in professional European football is: Hamstring injuries account for 12% of all accidents [1]. One of the injuries that cause the largest time loss for athletes at all levels of competition is an acute hamstring injury [2]. Athletes that compete in high-sprinting sports like track, football and rugby are more vulnerable to harm [3]. According to earlier research, approximately 1 in 3 hamstring injuries will repeat and many of these will do so within a year [4]. Approaches do not differ greatly when treating high-speed running *vs.* overstretch injuries [5]. This topic is an area for future research and investigation. The goals of rehabilitation for hamstring injuries are to return the athlete to sport, return to a prior level of performance and return to participation with minimal risk for re-injury [6]. As such, deficits experienced as a direct result of the injury (e.g. pain, swelling, weakness, reduced range of motion) must be addressed throughout the rehabilitation process [7]. In addition to treating muscle injury, underlying mechanical imbalances may be corrected to reduce the risk of recurrent injuries. Previous research has identified risk factors for an initial hamstring injury [8]. Of these, modifiable risk factors include hamstring weakness, fatigue, reduced flexibility, imbalances in hamstring eccentric and quadriceps concentric strength decreased quadriceps flexibility and strength and coordination deficits of the pelvis and trunk musculature [9]. It can be speculated that addressing these issues after hamstring injury would also likely decrease re-injury risk [10]. To prevent hamstring strain, traditional stretching exercise such as static, ballistic, or Proprioceptive Neuromuscular Facilitation (PNF) stretching is recommended prior to exercise or sporting activities [11]. Generally speaking, these types of stretching interventions are believed to improve the Range of Motion (ROM) and

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to decrease muscle stiffness, thereby serving as an important part of the warm-up procedure [12]. The passive straight leg raise test is a common test to examine hamstring muscle flexibility. Thus, these stretching techniques may prevent risk factors of hamstring strain [13].

Kase K invented the therapeutic taping method known as Kinesio Taping (KT) in Japan more than 25 years ago [6]. In order to support the fascia, muscles and joints, this technique is utilized as an alternative to sports tape; however, unlike athletic taping, KT permits full Range of Motion (ROM) and is also theorized to speed up the recovery process from injury by reducing pain and inflammation [14,15]. The press helped make this innovative tape technique well-known during the 1988 Seoul Olympics [16]. Since then, it has gained popularity as a therapeutic approach, particularly among athletes. This method has been utilized by doctors, physical therapists and athletic trainers to speed up recovery from musculoskeletal injuries [17].

The KT has been created to roughly replicate the thickness and weight of skin.

Statement of purpose

There is no gold standard for conservative treatment due to the significant occurrence of hamstring strain in athletes. Clinical professionals are using Kinesio taping and athletic taping more frequently to treat hamstring strains. This study's goal is to investigate the effects of Kinesio and athletic taping on vertical jump and dynamic function in patients with hamstring strain in a clinical context and to see if the findings from other studies can be corroborated by this one.

Objectives of the study

To examine the benefits of Kinesio taping combined with exercise on hamstring strain patients.

To examine the benefits of athletic taping combined with exercise in hamstring strain patients.

To examine the impact of Kinesio & athletic taping on patients with a hamstring strain during a vertical jump test.

To examine the impact of Kinesio & athletic taping on patients with hamstring strain's dynamic postural control.

Significance of the study

The main goal of treatment for a hamstring strain is to reduce the likelihood of recurrence of the injury while enabling athletes to resume their sport at a level of performance comparable to before the injury. Treatment should focus on functional performance in order to achieve this. Despite the fact that there have been several studies on different therapies and treatments for hamstring strain, their effects have been rather insignificant. As a result, a treatment plan with specified treatment objectives and progression criteria was suggested in this study comparing the benefits of Kinesio taping with exercises and Rigid taping with exercises on functional performance and return to sports activities.

Hypothesis

The following hypotheses were developed based on the study's objectives and treatment protocol assumptions:

In this research, it is hypothesized that Kinesio taping *vs.* Rigid taping with exercises protocol would result in a significant improvement on selected criterion variables in the Vertical Jump Test (VJT).

It is also hypothesized that the improvement during testing period on selected criterion variables would differ significantly between the two groups.

Materials and Methods

The methodology adopted for the selection of subjects, selection of variables, selection of tests, procedure for data collection of outcome measures, experimental design, experimental protocols and statistical techniques have been explained.

Data collection: Samples were selected from the sports players of Sanskriti University.

Sample size: A total of 20 subjects were administered for this study.

Study design

The study design consisted of a convenience method in which the participants assessed with Hamstring Strain selected their preferred group (Kinesio Taping with exercise and rigid taping with exercise). Both groups consisted of symptomatic hamstring strain population

Sampling method: Subjects were assigned by convenience sampling method.

Dependant variables:

The dependent variables include:

Vertical Jump Test (VJT)

Star Excursion Balance Test (SEBT)

Independent variables:

The independent variables considered in the study are:

GROUP A=Participants treated with Kinesio Taping with exercise

GROUP B=Participants treated with Rigid Taping with exercise

Time

Pre=measurements taken just prior to the intervention

Post=measurements taken immediately after the intervention

Study duration: A total duration of 4 months was assigned for the study.

Inclusion and exclusion criteria

Inclusion criteria:

Both males and females

Age group: (18-25yr.)

Acute Injury

Pain with resisted knee flexion

Pain provocation on the isometric contraction of Hamstrings

Active Hamstring Stretch Test positive

Exclusion criteria:

Uncertain clinical diagnosis

Suspected posterior thigh muscle injury

Pain on palpation at the origin or insertion of the posterior thigh muscles.

Extrinsic trauma to the posterior thigh

Tendon avulsion or total rupture of hamstring muscles

Sciatica

Recent fractures

Open wound

Allergic tape reaction

Instruments

Kinesio Tape

Rigid Tape

Under wrap

Tape Scissor

Measuring tape

Chalk

Data collection

Informed consent was mandatory for all participants willing to participate in the study. If the participant wished to take more time to read the informed consent, make a decision at a later time, or had any questions regarding the research, they were granted the time they needed and called or emailed the researcher about any questions or concerns. Following participants' consent to participate in the study, they were identified with a number to ensure anonymity

and confidentiality, which was recorded on a printed hard-copy data collection sheet. For the duration of the study, the physiotherapist identified each participant with his or her corresponding number. All information was recorded on the data collection sheet, which was then collected by the researcher.

Total of 30 individual were selected according to the inclusion and exclusion criteria and informed consent was obtained, they were informed about safety and simplicity of the procedure. Subjects willing to participate were divided into two groups GROUP A and GROUP B and they were briefed about the study and the intervention after which their written consent were taken. All the subjects underwent pre-test measurement with vertical jump test and star excursion balance test and the post-test were taken at the end of 8 weeks. The participants in Group A received the Kinesio taping with exercises for 2 sessions per week for 6 weeks. Subjects were reassessed by after 2 weeks to check the hamstring muscle extensibility using the vertical jump test and star excursion balance test in the hamstring strain.

Procedures

The participants were asked to select a preferred group: Kinesio taping with exercises and Rigid taping with exercises treatment. The physiotherapist continued the Hamstring strain exercise treatment plan with the incorporation of Kinesio tape or rigid tape depending on the participants' group preference. Additionally, the participants were numbered to ensure patient-confidentiality and the physiotherapist provided the researcher with the participant's number prior to each individual data collection. Each subject undergoes a pre-taping session. The Vertical Jump Test and Dynamic postural control of all the participants should be checked. Then, 15 participants are performed Kinesio taping with exercises and 15 other participants undergo rigid taping with exercises.

Kinesio taping technique

Apply lymphatic corrective technique to reduce hematoma resulting from bleeding. Two strips will be used. The first lymphatic strip should start medially to the ischial tuberosity and cross over the lateral aspect of the posterior thigh area of possible hematoma. The second lymphatic strip should start lateral to the ischial tuberosity and cross over the medial aspect of the thigh in the area of possible hematoma. The examiner should create a crisscross pattern over the posterior aspect of the thigh using 25% or paper-off tension. Basic Kinesio Taping Method application of a hamstring muscle using a Kinesio I strip: Kinesio strip is placed directly over the area of pain. Begin by placing the base of the Kinesio I strip as close as possible to the origin of the hamstring group with no tension. Have the patient move into hip flexion to place the hamstring on a stretch. If the patient's range of motion is limited due to injury, additional tension will be need to be added to the Kinesio I strip. Apply light tension (25% of available) to the Kinesio I strip. As the Kinesio Tape crosses over the area of injury, increases the Kinesio I strip tension to moderate tension (50% of available). This will provide additional space for oedema removal. Then reduce tension to 25% over remaining length of Kinesio strip. Lay down the 2-3 inches of the Kinesio I strip with no tension. Initiate glue activation prior to any further. The mechanical correction I strip is placed directly over the injured area. This provides additional proprioceptive stimulation to the muscle for support, similar to wearing a neoprene sleeve. Begin by tearing the Kinesio I strip in the middle of the paper backing and peeling back the middle third. Apply the centre of the Kinesio I strip with moderate to severe tension (50-75% of available) and inward pressure directly over the injured site. Lay down the tails of the Kinesio I strip with no tension. Initiate glue activation prior to any further patient movement (Figures 1 and 2).

Rigid taping technique

The purpose of the Rigid taping is to provide compression to a strain or a contusion in acute stage. The athlete should be in standing position. Shave the hair from the back of the thigh. Spray the thigh with tuf-skin. Secure one 2" white adhesive tape strip on the outside of the injured area and one 2" white adhesive tape strip on the inside of the injured area. Start the first compression strip just below the area of injury on the inner back of the thigh, travelling upwards on a 45º angle. The next support strip starts on the outside anchor of the back of the thigh. From here, the strip travels upwards to the inside of the thigh on a 45º angle. Repeat the above strips while overlapping by half width of the tape until the area is fully covered. The tape strips do not go completely around the thigh. Cover the support with under wrap. This decreases the possibility of the wrap moving or sliding during activity. Close the entire tape job with a 6" tensor bandage. Have the athlete contract the muscle. Start to apply the tensor below the injury then work upwards with a "'TUG" on a 45º angle. Now, spiral around the thigh and work the tensor downwards with a "TUG" on a 45º angle as well. Repeat this up and down configuration to create a herring bone pattern. Secure the wrap with 3 clips. Do not finish the clip on the inside of the leg as they could rub and cut the opposite leg or just pop off. Secure the wrap with one 3" elastic tape strip (Figure 3).

Exercise protocol

Physical therapy protocols including manual therapies, eccentric exercises of Hamstrings, Dynamic agility drills like Side shuffles, Carioca, Forward and Backward running etc. Manual therapies are too given to the participants of both the groups for 10-15 minutes by the therapist. Single leg chair bridge, T-lift lunge walk, Modified Nordic Curls were included in this protocol to improve the eccentric of the Hamstrings. Participants were reassessed at the end of 14th week before changing the tape. Participants were instructed that if they missed a therapy session, they could take off the tape on their own and follow the exercise protocol at home with weights if they had or otherwise without weights (Table 1) (Figures 4-6).

Results

The participants were randomly selected among students and taken into considerations for the purpose of achieving research objectives, which accounted for a total of twenty (20) participants. The selected participants were segregated into two groups, Group–A: Kinesio Taping with exercises group and Group–B: Rigid Taping with exercises. Thereby, the selection of the study participants was randomized. The number of male and female study participants chosen in each of the groups is illustrated as in Figure 7.

Among the selected twenty participants, in Group A out of 10 participants, total of five participants are affected on the left side and rest of five participants are affected on the right side, whereas in Group B out of 10 participants, total of four participants are affected on the left side and the rest of the six participants are affected on the right side. The number of study participants on the basis of group and affected side was shown in Figure 8.

Participant demographics

The demographic participant's features for each group are displayed in the

Figure 1. Kinesio tape for lymphatic correction of hamstring strain.

Table 2. There were 6 male participants and 4 female participants in Kinesio Taping group (Group A), whereas in Rigid Taping Group (Group B) there are 5 male and 5 female participants.

The demographic participant features for each group are graphically illustrated in Figure 9.

Individual analysis, interpretation and results

The Mean and Standard Deviation values of Vertical Jump Test of Kinesio Taping and Rigid Taping during pre-test and post-test have been given in Table 3.

The scores of Vertical Jump Test prior to and after the testing period for both the males and females among the groups have been graphically illustrated in Figure 10.

The data on Vertical Jump Test for both males and females of both the groups have been analysed by three-way factorial ANOVA (2 × 2 × 2) with repeated measures on last factor and the results are presented in Table 4.

*Significant at 0.05 level

From the Table 4, it is clear that statistically significant difference exist among groups as the obtained F (1, 40) is 0.390, (p>0.05) for groups. It is evident that the vertical jump test between groups irrespective of gender and tests differed significantly.

Figure 2. Kinesio tape for space correction in hamstring strain.

Figure 3. Rigid taping for hamstring strain.

Table 1. Rehabilitation protocol for hamstring strain.

Phase 1 (0-4 weeks)	
Stationary biking with full knee extension	
Progressive agility and trunk stabilization exercises	
Low-to-moderate intensity side stepping	Low-to-moderate intensity grapevine stepping (lateral stepping with the trail leg going over the lead leg, and then under the lead leg), both directions
	Low- to moderate-intensity steps forward and backward
	Single leg stand, with eyes open to eyes closed
	Prone abdominal body bridge
	Supine extension bridge
	Side bridging
Phase 2 (2-6 weeks)	
Manual therapy techniques	Ankle dorsiflexion
	Spinal mobility limitation exercises
	Soft tissue release techniques
	Avoid direct hamstring stretches

Therapeutic exercises	Moderate-to-high intensity grapevine stepping
	Moderate-to-high intensity steps (forward & backward)
	Single leg stand windmill touches
	Supine bent knee bridge walk
	Push-up stabilization with trunk rotation
	Side plank stabilization with trunk rotation
	Fast feet in place
	Low to high & High to low Wood chops
	Neuromobilization techniques
	Progressive balance training with balance board
Eccentric resistance training	The Diver exercise
	The Glider exercise
Phase 3 (4-8 weeks and beyond)	
Self-assisted soft tissue mobilization exercises	
Stretching exercises	
Dynamic agility drills	Side shuffles
	Carioca
	Boxer shuffles
	Skips
	Forward and Backward running
	Repetitive hand backward hops for distance
Eccentric hamstring training exercises at end range of motion	Single leg chair bridge
	Single leg windmill touches with dumbbells
	Lunge walk with trunk rotation, opposite hand with dumbbell toe touch
	T-lift lunge walk
	Single leg deadlift
	Single leg dumbbell hang clean
	Modified Nordic curls

Figure 4. Carioca agility drill.

Figure 5. T-Lift.

Figure 6. Lunge walk deadlift.

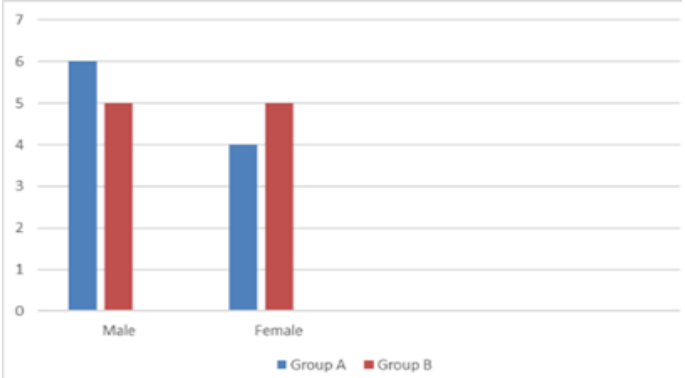

Figure 7. Classification of the study participants based on gender wise.

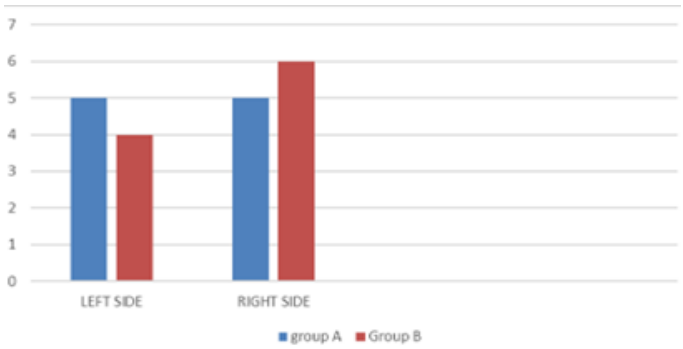

Figure 8. Classification of the study participants based on affected side.

Further, the non-existence of statistically considerable difference between gender is obvious from the results depicted in Table 4, as the obtained F (1, 40) is 0.410, (p=0.580) for gender. It is evident that the Vertical Jump test between groups irrespective of groups and tests differed significantly.

Additionally, it is also observed that no statistical significant difference exist for the interaction of groups and gender as the obtained F (1, 40) is 0.578, (p=0.552) for the interaction of groups and gender. It is evident that the Vertical Jump Test for the interaction of groups and gender irrespective of tests did not differ significantly.

Whereas, Table 4 shows that existence of statistically significant difference between tests as the obtained F (1, 40) is 390.475, (p>0.05) for tests. It is found that the Likert Score between tests irrespective of groups and gender differed significantly, reflecting the effectiveness of testing protocol.

Furthermore, from Table 4, it is evident that the obtained F (1, 40) is 25.050,

Table 2. Demographic participant features for kinesio taping group and rigid taping treatment groups.

Tests	Gender	Kinesio Taping (Group A) (n=10)		Rigid Taping (Group B) (n=10)	
		Mean	SD	Mean	SD
Vertical jump test (cm) Pre-test	Male	36.33	6.1536	29.8	2.9496
	Female	36	5.4772	28.4	2.881
	Total	36.2	5.5737	29.1	2.846
Vertical jump test (cm) Post-test	Male	39.33	4.761	30.6	2.7928
	Female	38.25	5.058	29	3.5355
	Total	38.9	4.6296	29.8	3.1198
SEBT (cm) Pre-test	Male	77.83	5.0365	73.6	1.1402
	Female	74	3.9158	74.6	3.2094
	Total	76.3	4.8086	74.1	2.331
SEBT (cm) Post-test	Male	81.16	4.6224	73.8	1.3038
	Female	76	3.266	74.4	2.51
	Total	79.1	4.7481	74.1	1.912

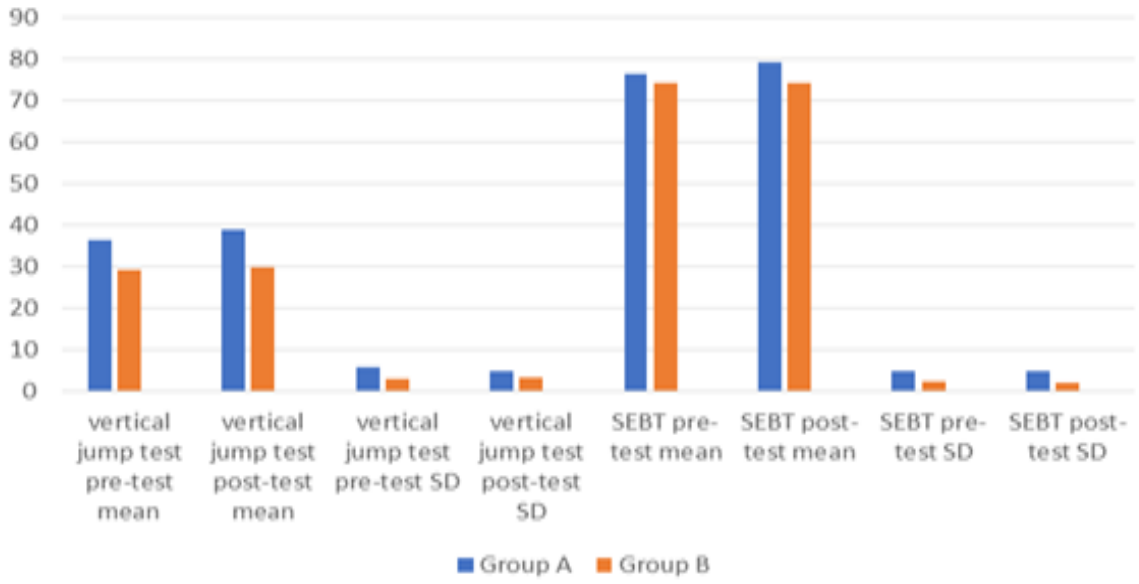

Figure 9. Graphical Illustration of the demographic participants features for each group.

Table 3. Mean and standard deviation of Vertical Jump Test (VJT) of pre-test and post-test of different groups for both males and females.

Group	Gender	Pre test	Post test
Group A	Male	5.30 ± 0.5000	0.80 ± 0.9000
	Female	5.0 ± 8.7900	2.33 ± 0.9165
Group B	Male	5.75 ± 0.9864	2.25 ± 0.8864
	Female	5.0 ± 0.0000	3.0 ± 0.0000

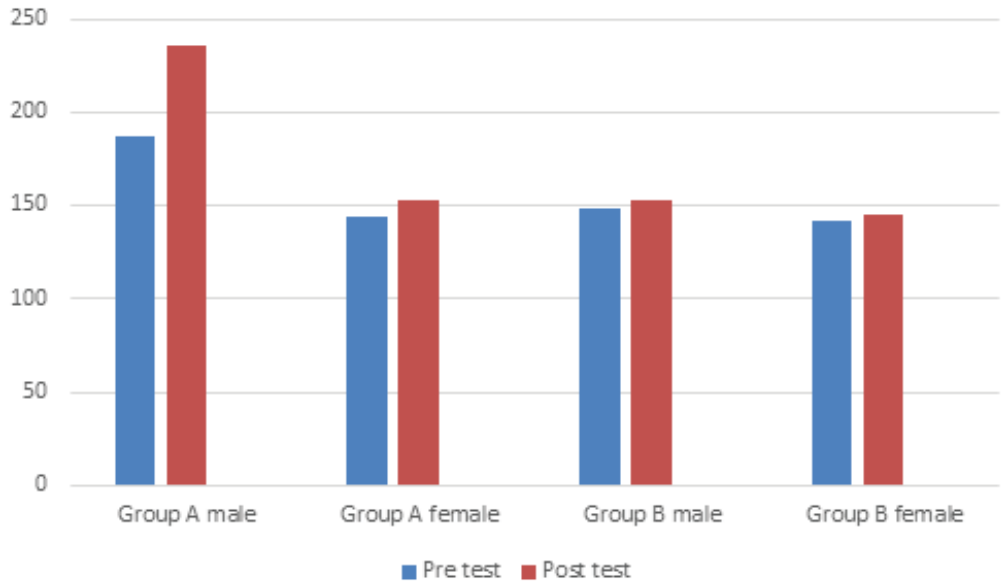

Figure 10. Graphical Illustration on vertical Jump test of both males and females of both the groups.

Table 4. Analysis of Variance (ANOVA) on Vertical jump test for both males and females of both the groups at two different testing periods.

Source of Variance	Type III Sum of Squares	Df	Mean Square	'F' Ratio	Sig.
Groups	3.494	1	2.494	0.39	0.438
Gender	3.973	1	2.973	0.41	0.58
Groups*gender	3.235	1	3.235	0.478	0.552
Error	140.246	40	4.868	-	-
Tests	250.678	1	250.678	390.475	0
Tests*groups	14.643	1	14.643	25.05	0
Tests*gender	0.005	1	0.005	0.005	1
Tests*gender*group	2.157	1	2.157	2.779	0.291
Error (Tests)	25.416	40	0.65	-	-

Table 5. Mean and standard deviation on Star Excursion Balance Test (SEBT) during pre-test and post-test for males and females of different groups.

Group	Gender	Pre test	Post test
Group A	Male	45.0 ± 5.7610	68.0 ± 4.8297
	Female	44.5 ± 5.5935	62.0 ± 8.6420
Group B	Male	34.75 ± 4.0119	74.25 ± 4.1510
	Female	32.5 ± 0.8071	76.0 ± 1.6142

Table 6. Analysis of Variance (ANOVA) on Star excursion balance test for both male and female of both the groups at two different testing periods.

Source of Variance	Type III Sum of Squares	Df	Mean Square	'F' Ratio	Sig.
Groups	6.219	1	6.219	3.369	0.13
Gender	0.02	1	0.02	0.008	0.832
Groups*Gender	2.042	1	2.042	0.573	0.596
Error	8.9.318	38	3.2203	-	-
Tests	322.477	1	322.477	150.998	0
Tests*Groups	28.156	1	28.156	10.837	0.002
Tests*Gender	0.378	1	0.378	0.12	0.83
Tests*Gender*Group	0.008	1	0.008	0.005	0.858
Error (Tests)	80.591	38	3.294	-	-

(p>0.05) for the interaction between tests and groups. The finding of the study implies that significant differences exist for the improvement on vertical Jump test among both the groups and two tests irrespective of gender (Tables 5 and 6).

From the Table 6, it is clear that statistical significant difference exist among groups as the obtained F (1, 38) is 3.369, (p>0.05) for groups. It is evident that the Star Excursion Balance Test between groups irrespective of gender and tests differed significantly.

Further, the non-existence of statistically considerable difference between gender is obvious from the results depicted in Table 6, as the obtained F (1, 38) is 0.008, (p=0.832) for gender. It is evident that the Star Excursion Balance Test between gender irrespective of groups and tests did not differ significantly.

Additionally, it is also observed that no statistical significant difference exist for the interaction of groups and gender as the obtained F (1, 38) is 0.573, (p=0.596) for the interaction of groups and gender. It is evident that the Star Excursion Balance Test for the interaction of groups and gender irrespective of

tests did not differ significantly.

Whereas, Table 6 shows that existence of statistically significant difference between tests as the obtained F (1, 38) is 150.998, (p>0.05) for tests. It is found that the between tests irrespective of groups and gender differs significantly.

Furthermore, from Table 5, it is evident that the obtained F (1, 38) is 10.837, (p>0.05) for the interaction between tests and groups. The finding of the study implies that significant differences exist for the improvement of the Star Excursion Balance Test among both the groups and two testing periods irrespective of gender.

Discussion

Numerous researchers have reported the effect of KT for function, pain and ROM in the past. However, the results are mixed and further investigation was warranted. The purpose of this study was to investigate the effect of KT on vertical jump and dynamic postural control on healthy individuals. The results of this study added to the mixed results previous researchers have found regarding the effectiveness of KT. It was partially consistent with previous reports that showed no difference in the vertical jump height for patients with KT application. Although these results contradicted the most recent study done by Mostert-Wentzel K, et al. that showed increased explosive power with KT application [12]. However, Mostert-Wentzel showed improvement for both taping conditions (experimental and placebo), thus the influence of the KT may be questioned. This current study also showed a significant improvement of SEBT scores for female participants which was a contradictory outcome compared to the previous study that found no significant difference in SEBT performance with tape application.

The current study demonstrated a limited effect of KT treatment on dynamic postural control compared to the placebo group. The limitations were seen within the gender, direction and timing. The significant effect was only applicable to female participants and only in the posterior-medial and medial directions of the SEBT test. In addition, the effects of the improvement in SEBT scores for the two directions were found when pre- and 24-hour post-time periods were compared and not for pre- and immediate post-time periods. This corresponds to the previous study 31 in which they showed no significant increase of muscle peak torque 10 minutes after tape application, but increased torque after 24 hours of KT application. Therefore, these findings may indicate that the potential benefits of KT application are only available with prolonged tape application.

The physiological mechanism by which the KT may have been presumed to work remains a speculation since it is beyond the scope of this study. Nonetheless, a few hypotheses will be proposed to possibly explain the difference. In this current study, the main difference between the control and experimental group was the existence of tension in the KT for the experimental group compared to the lack of tension in the control group. It is a possibility that the tension provided by the real application might have increased the neural feedback to the participants during ankle movement, facilitating increased balance. Tactile input has been shown to alter motor control by changing the excitability of the central nervous system. This is in accordance with the claim that the tape applied with tension in the direction of the muscle fibres would facilitate the strength of the underlying muscles. However, it contradicts many other studies that showed no indication that the taping influenced muscle activity assessed *via* electromyography or by the isokinetic dynamometer. One possible explanation for this is that the tactile input from the KT was not strong enough to produce increased muscle power for vertical jump, but was enough to stimulate cutaneous mechanoreceptors in order to improve muscle excitability. It is possible that increased muscle excitability of the tibialis anterior may have worked to prevent excessive pronation and navicular drop, thus stabilizing the ankle when participants were reaching in the posterior-medial and medial direction. This corresponds with a study conducted to examine the effects of orthotics on dynamic postural control. In the study conducted by Olmsted and Hertel, the SEBT scores improved for participants with orthotics in the lateral direction possibly due to heightened plantar cutaneous receptor activity, leading to enhanced neuromuscular function allowing increased stability during dynamic reaches. However, additional research is necessary to determine why in this current study, the effect of KT was only seen on posterior-medial and medial directions and not on the lateral directions. Several researchers have suggested that reaching eight directions of the SEBT is redundant and that posteromedial direction reach was the most representative of overall performance of the SEBT in healthy individuals. In addition, for individuals with chronic ankle instability, Hertel J, et al. concluded that anteromedial, medial and posteromedial directions showed greater sensitivity to functional deficiencies of the ankle [16]. Therefore, in this current study, the effect of KT may have been seen only in the most sensitive directions of the SEBT, posteromedial and medial and not in any other directions. However, why the SEBT is more sensitive to these medial reach components is not clear and warrants further study.

The main finding of this study is that any benefits of Kinesio Taping and Rigid Taping were not observed in patient with presenting with symptoms of Hamstring Strain. Data of the study indicate that although some improvement over the time in patient reported parameters has taken place in all the three groups, it was not meaningful. The objective parameter of the functional performance, i.e., dynamic functional control and vertical jump test also shows any improvement or not post treatment in any group.

Parreira, et al. attributed the growing use of KT to massive marketing campaigns rather than high quality, scientific evidence with clinically relevant outcomes. They suggested that the clinicians should carefully consider the costs and the effectiveness of this intervention when deciding whether to use this intervention. The similar opinion was also put forth by Kalron and Bar Sela who noted that in contrast with most physical therapy modalities, the marketing of KT tape utilizes far more intense promotion strategies that may have the ability to attract the uninformed amateur sports professionals. They further opined that the role of health professional should be to confirm the effectiveness of a modality through evidence based knowledge not only due to its popularity.

Conclusion and Limitations

The present study was conducted to evaluate the effect of Kinesio taping and Rigid taping in real life situation where the sports person continued their normal training schedule and the treatment was carried along with the training and aggravating situations. We have observed significant advantage of Kinesio Taping application in participants with Hamstring strain over rigid taping. Being a comparative study, it has not employed independent assessor to record the outcome measures which can be considered as a major limitation of the study. The inability to control the psychological variables that might have affected the outcomes could be another limitation as taping is known to exert a placebo effect. In view of the relatively small sample size, it is imperative to cross-validate the observations on a larger sample size using double-blind randomized trials. In conclusion, much against the popular perception, the addition of Kinesio Taping has yielded beneficial effects in the management of Hamstring strain.

References

1. Fong, Daniel Tik-Pui, Youlian Hong, Lap-Ki Chan and Patrick Shu-Hang Yung, et al. "A systematic review on ankle injury and ankle sprain in sports." *Sports Med* 37 (2007): 73-94.
2. Johnson GB, et al. “Athletic taping and bandaging.” Safran MR, McKeag DB, Van Camp, eds. Manual of Sports Medicine. Philadelphia, PA: Lippincott-Raven (1998): 635-638.
3. Metcalfe, Richard C., Gretchen A. Schlabach, Marilyn A. Looney and Edward J. Renehan. "A comparison of moleskin tape, linen tape, and lace-up brace on joint restriction and movement performance." *J Athl Train* 32 (1997): 136.
4. Refshauge, Kathryn M., Sharon L. Kilbreath and Jacquelene Raymond. "The effect of recurrent ankle inversion sprain and taping on proprioception at the ankle." *Med Sci Sports Exerc* 32 (2000): 10-15.
5. GonzáLez-Iglesias, Javier, César Fernández-de-Las-Peñas, Joshua Cleland and Peter Huijbregts, et al. "Short-term effects of cervical kinesio taping on pain and cervical range of motion in patients with acute whiplash injury: A randomized clinical trial." *J Orthop Sports Phys Ther* 39 (2009): 515-521.
6. Kase, Kenzo. "Clinical therapeutic applications of the Kinesio (! R) taping method." *Albuquerque* (2003).
7. Kaya, Erkan, Murat Zinnuroglu and Ilknur Tugcu. "Kinesio taping compared to physical therapy modalities for the treatment of shoulder impingement syndrome." *Clin Rheumatol* 30 (2011): 201-207.
8. Chang, Hsiao-Yun, Kun-Yu Chou, Jau-Jia Lin and Chih-Feng Lin, et al. "Immediate effect of forearm Kinesio taping on maximal grip strength and force sense in healthy collegiate athletes." *Phys Ther Sport* 11 (2010): 122-127.
9. Merino-Marban, R., E. Fernandez-Rodriguez, I. Lopez-Fernandez and D. Mayorga-

Vega. "The acute effect of Kinesio taping on hamstring extensibility in university students." *J Phys Educ Sport* 11 (2011): 133.

10. Aktas, Gulcan and Gul Baltaci. "Does kinesiotaping increase knee muscles strength and functional performance?." *Isokinet Exerc Sci* 19 (2011): 149.
11. Vithoulka, I. A., A. B. Beneka, P. B. Malliou and N. B. Aggelousis, et al. "The effects of Kinesio-Taping® on quadriceps strength during isokinetic exercise in healthy non athlete women." *Isokinet Exerc Sci* 18 (2010): 1-6.
12. Mostert-Wentzel, Karien, Johannes J. Swart, Lieketseng J. Masenyetse and Bafana H. Sihlali, et al. "Effect of Kinesio taping on explosive muscle power of gluteus maximus of male athletes." *S Afr J Sports Med* 24 (2012): 75-80.
13. Briem, Kristin, Hrefna Eythörsdöttir, Ragnheidur G. Magnúsdóttir and Rúnar Pálmarsson, et al. "Effects of kinesio tape compared with nonelastic sports tape and the untaped ankle during a sudden inversion perturbation in male athletes." *J Orthop Sports Phys Ther* 41 (2011): 328-335.
14. Williams, Sean, Chris Whatman, Patria A. Hume and Kelly Sheerin. "Kinesio taping in treatment and prevention of sports injuries: A meta-analysis of the evidence for its effectiveness." *Sports Med* 42 (2012): 153-164.
15. Beekly Matt and Jim Brown. "Reliability of the Vertimetric vertical jump measurement device." Safe Responder, LLC (2012).
16. Hertel, Jay, S. John Miller and Craig R. Denegar. "Intratester and intertester reliability during the star excursion balance tests." *J Sport Rehabil* 9 (2000): 104-116.
17. Bicici, Seda, Nihan Karatas and Gul Baltaci. "Effect of athletic taping and kinesiotaping® on measurements of functional performance in basketball players with chronic inversion ankle sprains." *Int J Sports Phys Ther* 7 (2012): 154.

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