Original Article

Effectiveness of Kinesiology Taping In Acute Medial Tibial Stress Syndrome

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Abstract

Objective: to evaluate the effectiveness of Kinesiology Taping with conventional physical therapy in patients with Medial Tibial Stress Syndrome.

Study design: It is a randomized control trial study.

Place and duration of study: A five-month study was carried out in Smart Health and fitness club (SMARTS) and Fitdiction Gym Islamabad. (from April 2019 to August 2019)

Material and Methods: Athletes with ages between 18-35 years, of both gender, having MTSS score between 4-10 were recruited in the study. A total of 30 patients were split into two groups randomly, with 15 in each. Group 1 received Kinesiology Taping alongside conventional physical therapy (Cryotherapy+ TENS+ Calf muscle stretch), while Group 2 only received conventional physical therapy. Treatments were administered every other day for three weeks**.**

Results: Within the group analysis utilized repetitive measure ANOVA. The average NPRS percentages for both groups were similar at the start. However, for the experimental group NPRS percentages as well as average MTSS percentage, there was a significant decrease till the end (0.90 &1.00 respectively) of the sessions. Between-group analysis was carried out using an independent t-test. Both the NPRS and MTSS results were statistically significant in both groups ($p<0.01$), but the mean values indicated that the experimental group exhibited a greater reduction in pain and an enhanced functional level compared to the control group**.**

Conclusion: Kinesiology taping combined with standard physical therapy proved effective in lessening pain and enhancing the functional status of athletes with medial tibial stress syndrome.

Keywords: Medial Tibial Stress Syndrome, Kinesiology Taping, Transcutaneous Electrical Nerve Stimulation, Cryotherapy, Calf Stretch, Numeric Pain Rating Scale, Medial Tibial Stress Syndrome Score.

1. Introduction

Medial tibial stress syndrome (MTSS), also known as shin splints, is a common injury in the lower limb and a major cause of exercise-related leg pain in athletes[1] and runners.[2,3] MTSS is manifested as dull burning or aching pain in the lower leg and leg discomfort caused by repetitive movements on firm surfaces.[4] It is often observed in military recruits due to their very strenuous activities and prolonged standing or marching. Epidemiologically, athletes widely suffer such injuries and the percentage of affected athletes by MTSS is about 4 to 35 percent,[5] 35% in military recruits and 13.6 to 20% specifically in runners.[4] Generally, prevailing percentage persist to be 39% in women and 21% in men.[6] According to the Clement et al the occurrence of MTSS in a female runners (16.8%) is higher than a male runners (10.7%).[7] A number of terms are used to describe this exercise induced pain, including, shin soreness, tibial stress syndrome, shin splint, medial tibial syndrome, shin splints syndrome, exertional leg pain[6] and soleus syndrome.[8,9,10] Repetitive weight bearing activity aggravates its intensity[2,3] and a localized pain and tenderness on palpation[9,20] is usually reported along the middle and the distal thirds of the posteromedial tibia[11] around 5cm of length[6] Resistance tests of the posterior tibial and soleus muscles are painful.[12] Factors that predispose a person towards occurrence of MTSS are female gender[14], preceding history of MTSS, less running experience, orthotic utilize, increased body mass index, increased navicular drop, and amplified external rotation hip range of motion in males[7] as well as pronated foot type[15], bone geometry[10], gait kinematics[11,12], leg length differences[16], lean calf girth , muscle strength and running technique also play their role[17,13].

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Swelling and tenderness along with some other signs are usually observable on tibial posteromedial aspect, during the examination. Radiographs, computed tomography, magnetic resonance imaging, and bone scintigraphy and Shin Palpation Test (SPT), Shin Oedema Test (SOT) can be used to rule out the condition for differential diagnosis.[18,19]

The usual treatment option available during the acute phase is RICE (Rest, Icing, Compression, and Elevation) protocol which is intended to reduce the inflammation and the pain along with use of Non-Steroidal Anti-Inflammatory Drugs (NSAIDS) for five to seven days.[20] Activity alteration, amendment of modifiable risk factors, custom foot orthosis, shoe modifications, motion control foot wear, therapeutic adhesive taping, splinting or gait training are some of the other available options[1] Alternate treatment in the case of no response to the available options, Injections (cortisones), acupuncture or posterior fasciotomy can also be done.[1] Physical therapy methods and treatments are employed for assistance. Various techniques such as iontophoresis, phonophoresis, ice massage, ultrasound, low-energy laser treatment, periosteal pecking, stretching and strengthening exercises, sports compression stockings, lower leg braces, extracorporeal shockwave therapy, TENS[22,23] and pulsed electromagnetic field have been extensively researched[17,21] along with augmented soft tissue mobilization, whirlpool baths and non-weighted ambulation in the acute stages.[1]

Recently, a technique introduced by Dr. Kenzo Kase in the 70's, which is Kinesiology Taping has attracted interest among sports medicine clinicians for the treatment of many musculoskeletal conditions.[24,25] This technique is expected to have four effects; to adjust muscle function[26] to amplify lymphatic[27] and vascular flow, to lessen pain, to help in the correction of possible articular malalignment[28,29] and it also reduces the irritation and pressure of the neurosensory receptors which produce painful sensations.[30] It also regulates nociceptive processing, stimulate cutaneous mechanoreceptors and change skin tension.

There is dearth of evidence for any of the intervention used for the management of MTSS or any part of Kinesiology Taping for eliminating pain in it is not evident, especially in Pakistan till now. No appropriate treatment decorum for handling MTSS has been recognized so far. Treatment given for MTSS is solitary traditional and no intrusion has much meaning over the other.

So in this study we focused on the use of Kinesiology Taping as an adjunct to traditional physical therapy treatment as the researches have deficiency of data about its effects in MTSS as many authors recommended to further investigate the MTSS Score and we will relate its efficacy with and without KT for decreasing pain and taming quality of health among athletes and runners suffering from acute MTSS. The bringing into play of KT may bequeath us with a more feasible and less protracted approach to reduce recovery time of injury as contrasting to conventional therapeutic modalities and it can benefit athletes as well.

2. Materials & Methods

This randomized control trial was completed over a time period of 05 months from April 2019 to August 2019. Sample size was 30. Data of athletes were selected through non-probability purposive sampling technique and allocated randomly into experimental (n=15) and control groups(n=15) Athletes with ages between 18-35 years, of both gender, having MTSS score between 4-10 were recruited in the study. Asthmatic Patients, Patients with known cardiovascular disease, Open wounds, Uncontrolled hypertension (resting brachial blood pressure ≥ 140/90 mmHg), Any skin allergic condition (Because of KT application) were excluded from the study. Data was collected through self-structured questionnaire for pain at rest via NPRS, pain with activity via NPRS after 50 m sprint activity and MTSS score to assess the severity of Medial Tibial Stress Syndrome. Consent was taken from all the patients included in the study and then interventions were applied. Experimental Group received 10 minutes of cryotherapy followed by 20 minutes of TENS along with passive calf muscles stretching and kinesiology taping afterwards. Control group received cryotherapy for 10 minutes, TENS for 20 minutes along with sustained passive calf muscles stretching for 5 mins. For examining within-group differences, a Repeated Measures ANOVA was employed, and to assess between-group variances, an Independent t-test was used. The data underwent analysis using SPSS version 21.

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3. Results

In a current study, Out of 30 participants males were 11 (36.67%) and females were 19 (63.33%). Figure: 1 showed the participants of different age groups were considered ranging from 18-35 years of age**.**

Results of between groups comparison

Table 1 showed independent t-test interpretation of MTSS (Medial Tibial Stress Syndrome) Score. Baseline score in experimental group(7.40 ± 1.844), whereas baseline score in active control group(7.47 ± 1.552) and the P-value = 0.915. Mid-line score in experimental group (3.40 ± 1.056), whereas mid-line score in active control group(5.40 ± 1.404), with a P-value = 0.000. Final score Mean in experimental group(1.00 ± 1.00), whereas final score in active control group (2.07 ± 1.223),and the P-value = 0.010.

Table 1 Mean, SD & P_ value of baseline, mid line and final MTSS Score between experimental and active control group.

Variables	Group of the participants	Mean±Std. Deviation	*P- value*
Medial Tibial Stress Syndrome's Baseline Score	Experimental	7.40±1.844	0.915
	Active Control	7.47±1.552	
Medial Tibial Stress Syndrome's Midline Score	Experimental	3.40±1.056	0.000
	Active Control	5.40±1.404	
Medial Tibial Stress Syndrome's Final Score	Experimental	1.00±1.000	0.010
	Active Control	2.07±1.223	

The table 2 illustrated independent t-test interpretation of NPRS (Numeric Pain Rating Scale) at Rest. Baseline score at rest in the experimental group (7.87 ± 1.407), whereas baseline score at rest in active control group(7.40 ± 1.595), and the P-value = 0.403. Mid-line score at rest in experimental group(3.33 ± 0.900), whereas mid-line score at rest in active control group (5.07 ± 1.335), and the P-value = 0.000. Final score at rest in experimental group(0.80 ± 1.082), whereas final score at rest in active control group(1.80 ± 1.014), and the P-value = 0.010.

Table 2: Mean, SD & P_ value of baseline, midline and final NPRS at rest between experimental and active control group.

Variables	Group of the Participant	Mean±Std. Deviation	*P _ Value*
Numeric Pain Rating Scale's Baseline Score At Rest	Experimental	7.87±1.407	0.403
	Active Control	7.40±1.595	
Numeric Pain Rating Scale's Midline Score At Rest	Experimental	3.33±.900	0.000
	Active Control	5.07±1.335	
Numeric Pain Rating Scale Final Score AT Rest	Experimental	0.80±1.082	0.010
	Active Control	1.80±1.014	

Table 3 displayed independent t-test interpretation of NPRS (Numeric Pain Rating Scale) with activity. Baseline NPRS score with activity in experimental group(8.93 ± 1.033), whereas baseline NPRS score with activity in active control group(8.60 ± 1.242), and the P-value =0.431. Final NPRS score with activity in experimental group(1.33 ± 1.113),whereas final NPRS score with activity in active control group(2.53 ± 1.125), and the P-value = 0.005.

Table 3: Mean, SD & P_ value of baseline and final NPRS with activity between experimental and active control group.

Variables	Group of the participant	Mean±Std. Deviation	*P _ Value*
Numeric Pain Rating Scale's Baseline Score With Activity	Experimental	8.93±1.033	0.431
	Active Control	8.60±1.242	
Numeric Pain Rating Scale's Final Score With Activity	Experimental	1.33±1.113	0.005
	Active Control	2.53±1.125	

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Results of comparison within groups:

Table 4,5 & 6 showed that Repeated measure ANOVA was applied to do within group comparison, all the P-values obtained were significant and had values less than < 0.05 and the value of Wilk's Lambda was 0.00.

Table 4: within group comparison of MTSS and NPRS at baseline versus Midline.

Variables	Group A (Experimental)			Group B (Active Control)		
	Baseline	Midline		Baseline	Midline	
	Mean±Std.Deviation	Mean±Std. Deviation	P-value	Mean±Std.Deviation	Mean±Std. Deviation	P-value
MTSS	7.40±1.844	3.40±1.056	0.000	7.47±1.552	5.40±1.404	0.022
NPRS	7.87±1.407	3.33±0.900	0.000	7.40±1.500	5.07±1.335	0.035

Table 5: Within group comparison of MTSS and NPRS at Midline versus Final Level.

Variables	Group A (Experimental)			Group B (Active Control)		
	Midline	Final		Midline	Final	
	Mean±Std. Deviation	Mean±Std. Deviation	P-value	Mean±Std. Deviation	Mean±Std. Deviation	P-value
MTSS	3.40±1.056	1.00±1.000	0.002	5.40±1.404	2.07±1.223	0.015
NPRS	3.33±0.900	0.80±1.082	0.000	5.07±1. 1	1.80±1.014	0.005

Table 6: Within group comparison of MTSS and NPRS at baseline versus Final level.

Variables	Group A (Experimental)			Group B (Active Control)		
	Baseline	Final		Baseline	Final	
	Mean±Std. Deviation	Mean±Std. Deviation	P-value	Mean±Std. Deviation	Mean±Std. Deviation	P-value
MTSS	7.40±1.844	1.00±1.000	0.001	7.47±1.552	2.07±1.223	0.036
NPRS	7.87±1.407	0.80±1.082	0.00	7.40±1.500	1.80±1.014	0.039

4. Discussion

Outcomes of the study proved our alternate hypothesis i.e. Kinesiology Taping with Conventional Physical Therapy is more effective than conventional physical therapy alone for treating acute MTSS. The current study was directed to evaluate the effectiveness for relieving acute pain in MTSS with or without kinesiology taping amid athletes and runners. The decrease in pain scale was more significant in the the experimental group as compared to the active control group.

From the significance level calculated in the tables and results it is apparent that Kinesiology taping along with conventional physical therapy is more operative for treating Acute Medial Tibial Stress Syndrome especially in the acute phase and it verified to be more effective for relieving much pain in the first 10 days of its application. Conventional physical therapy is also accommodating for relieving pain in runners with MTSS rendering our results but the adding KT as an adjunct to it aided us to achieve improved results in a little period of time. In the former years literature has attested its success in many musculoskeletal injuries.

A study was steered by Tsai et al on the short term effectiveness of kinesiology taping in plantar fasciitis and he also settled that kinesiology taping presented noteworthy results for reducing pain than traditional physical therapy in acute term if applied uninterruptedly for a week.[31] He also advocated that the pain drop with application of KT can be because of the lifting of fascia and circulation enhancement and this might relieve pain but his study was inadequate to tell that mechanical stimulation has any weighty role in pain relief. In our study the battered area was tibia and thickness of fascia was not greater as equated to plantar fascia and the affected region was more noticeable and superficial so, it might be conceivable that the shearing force of tape may excite nociceptors and/ or mechanoreceptors to diminish pain. Moreover, this past literature results were also similar to the current study results that Kinesiology taping is effective in reducing pain of MTSS.

Griebert et al decided that the medial loading in the lower leg is diminished with KT taping but mechanism was not submitted so there is a need for an elongated and extensive enquiry to comprehend its appropriate mechanism.[32] KT has been united with many other outmoded and untraditional interventions also with other taping procedures and tapes to consider its best results with or without any other intervention and many investigators described its work better along other interventions. It was similarly detected in our study that

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females were more likely to develop MTSS than males as one of the past studies have also determined it like clement et al concluded that female runners have higher risk of developing MTSS than males.[7] No valid consequence measures for MTSS had been clinched till these days in literature but our study validated it in within group analysis that acute liberation of pain was attained within the first 10 days of intervention in the trial group more than the last 10 days and this may help the therapists to create a shorter follow up intervention strategy for dismissing pain in MTSS. This study also reveals the enhancement of quality of life amid both groups but the significance was relatively higher in the experimental one.

The limitations of the current study are that the population was selected specifically from two gyms; Smarts Health and Fitness Club and Fitdiction Gym of Islamabad. Data collection was completed within a limited time frame due to athlete availability and the schedule provided by the gyms. A small group of 30 athletes was chosen because it's challenging to follow up on their sessions. Current study also involves the Lack of facility to exclude any psychological variability as taping is known to have a placebo effect.

Conclusion:

Based on the study's statistical analysis and findings, it's determined that using kinesiology taping with conventional physical therapy is more effective than using conventional physical therapy alone to treat acute MTSS. According to the significance level of our within group results pain was better relieved in the first 10 days of physical therapy intervention with KT taping than conventional physical therapy alone.

Recommendation:

It is recommended that kinesiology taping works better in relieving pain within a week of application along with conventional physical treatment and if we get a better understanding of this mechanism with more upcoming researches for short term relief of MTSS than this may help athletes and runners from getting prolonged treatments for acute shin pains. Prevention of reoccurrence of MTSS must be studied well. Further research is necessary to indicate preventive measures to reduce reoccurrence rates and to improve quality of health among athletes. Future research should consider conducting treatment sessions on consecutive days to evaluate the more frequent effects of kinesiology taping.

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Acknowledgements/Authors contribution:

RR contributed to the formulation of concepts and design of the study, statistical analysis, writing and revising of manuscript. SS contributed to the design of the study, writing and revising of manuscript. AJ contributed to the writing and revising of manuscript. SA, IS, RK contributed to providing advice on data collection and revising of manuscript.

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