

Comparing the Efficacy of Stretching and Taping in Treatment of Achilles Tendonitis in Sprinters

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Abstract: *Comparing the effectiveness of Stretching and Taping technique in preventing soft tissue injuries in ankle joint on performing 100m sprint Soft tissue injury is common in runners. Minimal study has been done on its prevention. Runners over use the soft tissue around the ankle joint, this leads to Tightness of TendoArchilles tendon, Instability in the ankle joint, Weakness of the soft tissue. A few studies have shown that preventive measures reduce the risk of soft tissue injury in ankle. But there are no studies showing the effect of Stretching and Taping around the ankle joint in preventing injuries in runner.*

Keywords: Prevention, Ankle joint, Runners, Stretching, Taping, Soft tissue injuries.

1. Introduction

1.1 Anatomic Considerations

The Achilles tendon is the largest and strongest tendon in the body. The tendinous components of these two muscles are variable. The gastrocnemius component longer portion, contributing 11 to 26 cm. The soleus in contrast is shorter contributing 3 to 11 cm in length. Approximately 5 to 6 cm proximal to the calcaneal insertion, the independent tendon of the gastrocnemius and soleus fuse to become one tendon.

The area of the tendon with the poorest blood supply is approximately 2 to 6 cm above the insertion into the calcaneum[1]. This area of avascularity is the most common site of Peritendinitis, tendinosis and rupture of the tendon[2],[3].

1.2 Need for study

The Achilles tendon is commonly injured by long distance runner. It also occurs in about 10% of runners but the condition also common in gymnasts, and tennis players [4],[5].

Running produces forces up to eight times the body's weight, placing significant repetitive stress on the tendon for prolonged periods. Tendonitis in athletes is usually caused by training errors and poor flexibility in the tendon [13].

The mean age of patients with Achilles tendonitis range from 24 to 30 years, and the youngest and oldest were 16 and 52 years respectively.

Runners with Achilles tendonitis problems had a significantly lower range of motion of the ankle joint.

The time of recovery of overuse tendinosis is 3 to 6 months[14]. When planning the treatment and rehabilitation of tendon injuries, the primary goals are reduction of pain, swelling and inflammation. Surgery is required in about 25% of the patients and the frequency of surgery increases with age, duration of symptoms and occurrence of tendinopathic changes.

BENEDICT F, DEBORAH A, DANIAL P (2006) has reported that long term benefits of the stretch include a marked decrease in pain and functional limitations and high rate of satisfaction. This approach can provide the health care practitioner with an effective, inexpensive and straight forward treatment protocol.

GARRICK REQUA (1973) has reported that taping has been shown to reduce the incidence of Achilles tendon injuries.

The aim of the present study is to find out the efficacy of stretching and taping in the treatment of Chronic Achilles tendonitis and to compare the significance of improvement in Pre and Post Treatment between 0 to 8 weeks.

1.3 Statement of problem

Does stretching or taping improve pain, ROM of ankle and sporting activity in patients with Chronic Achilles tendinosis.

1.4 Aim and objective

To find out the efficacy of stretching and Taping in Chronic Achilles tendinosis and to compare the significance of improvement between pre and post treatment of 0 to 8 weeks.

1.5 Null Hypothesis (Ho)

There is no significant improvement in pain, ROM of ankle and sporting activity in patients with Chronic Achilles tendinosis due to Stretching or taping technique.

1.6 Alternate Hypothesis

There is significant improvement in pain, ROM of ankle and functional activity in patients with Achilles tendonitis due to stretching or Taping technique.

2. Methodology

Study Design: Experimental

Setting: Clinical

Population: Male and Female subjects in the range of 18 to 30 with a history of Chronic Achilles Tendinosis.

Sample Size: 30 subjects each in two group.

Sample Technique: Simple random sampling technique/ Non-Probability Sampling.

3. Criteria

Inclusion criteria:

- Subjects around the age group of 18 to 35 years runners.
- Subjects who have a history of Chronic Achilles Tendinosis and long duration of symptoms (3 months to 24 months).
- Subjects with pain in the Achilles tendon, 2 to 6 cm above the insertion of the tendon on the calcaneum.

Exclusion criteria:

- History of Neurological/Vascular/Orthopedic disorders.
- Any recent injury to the lower limb.
- Total or partial rupture of the Achilles tendon.
- Recent fractures

Variables

- Pain
- ROM
- Sporting activity [7].

Statistical Method

The data will be analyzed by using Student t test and Independent sample “t” test (Unpaired “t” test)

Tools

- Universal Goniometer
- Visual analog scale (VAS)
- VISA A (Victorian Institute of sports Assessment – Achilles Tendinopathy) Questionnaire
- White Non-Adhesive Tape

4. Procedure

The Sixty subjects selected for study was randomly allocated to 2 groups say group A (Stretching) and group B (Taping). Thirty subjects in fulfilling the inclusion criteria are taken in each group for treatment. They received visual and verbal instruction about the treatment regimen.

Measurement of Variables

Pre- treatment Measurement:

Subjects were evaluated for the following before the commencement of the treatment program:

- Pain score
- Passive ROM of the ankle dorsiflexion and plantarflexion
- Functional activity

Pain score:

The amount of pain experienced by the patient is assessed during the following:

- When stretching the Achilles tendon passively,
- After walking on flat ground for 30 minutes,

- After 10 single leg heel raises
- Walking downstairs
- In single leg hop

The amount of pain is evaluated on a 10 cm VAS and VISA-A questionnaire.

On the Visual Analogue Scale (VAS), the patients were asked to mark their intensity of pain on a 10cm long line calibrated from 0 to 10 where no pain is recorded as 0 and severe pain as 10.

On the (VISA- A) questionnaire, the amount of pain is recorded from 0 to 10, where no pain 10 and severe pain as 0.

Range of Motion:

The Active ROM of dorsiflexion and plantarflexion of ankle are measured with a universal goniometer.

Sporting activity:

The level of sporting activity of the subject is assessed using the Victorian Institute of Sports Assessment- Achilles Questionnaire (VISA-A) questionnaire.

Questions 7 and 8 in the questionnaire assess the type and level of sporting activity and the level of pain during the sporting activity.

Treatment program

The subjects chosen for the treatment are given visual and verbal instruction before commencing the treatment. The subjects selected for the study was randomly allocated to 2 groups say group A (Stretching) and group B (Taping) consisting of 30 in each group. The subjects were instructed to do prior warm-up before proceeding to Stretching the Achilles tendon. Initial evaluation of their pain profile using Visual analogue scale (VAS) was taken. Ankle joint range of motion was measured by using Goniometer. VISA –A scores were taken using questionnaire.

Group A-Passive Stretching to Achilles tendon:

Position of the Physiotherapist: Walk stands

Position of the patient: Supine lying

Technique:

The patient's heel is grasped with one hand, while stabilizing the anterior aspect of the tibia with the other hand. Pulling the calcaneus downward using the thumb and fingers and gently pushing upward on the heads of the metatarsals.

Duration:

The hold is maintained for 30 to 40 seconds. Repeat the procedure 4 to 5 times without over stretching. The procedure is done once daily, 6 days a week for 8 weeks. During the 8th week running activity was allowed if it could be performed with only mild discomfort and pain.

Group B-Taping to the Achilles tendon

The Other group of subjects was given Taping to Achilles tendon, 8 hours daily for 6 days a week for 8 weeks.

Position of the Physiotherapist: Walk stands

Position of the Patient: Prone lying with the affected foot out of Coach.

Purpose: To provide support for the Achilles tendon by limiting extreme dorsiflexion of the Ankle.

Materials needed: 2-inch white adhesive tape, skin lubricant and Bandage scissors.

Application:

Anchors: Apply two 2” white adhesive tape forefoot anchors to the mid-arch and overlap them by the width of the tape. Apply three or four 2” white adhesive tape to the lower leg just below the belly of the calf muscle.

Support technique:

Place pad beneath heel anchors around mid-foot and calf. Place the anchors around the mid foot and calf, and a felt heel raise below the heel. Tape with the athlete prone and the foot plantarflexed. Three reins run between the foot and calf to maintain the plantar flexed position.

After 8 weeks subjects were evaluated for their pain profile using Visual Analogue Scale, Ankle range of movement using Goniometer and VISA-A Questionnaire, as pre and post treatment was taken respectively.

Tabulation and Interpretation on Comparing Stretching and Taping Technique during 0 to 8 weeks

Table 1: Descriptive Statistics for Pain on Comparing Stretching and Taping

Treatment	Pre-Test		Post Test		T- Value	P-value
	Mean	SD	Mean	SD		
Stretching	8.43	0.93	1.06	1.11	31.94	<0.05*
Taping	8.03	0.85	1.733	1.25	27.3	<0.05*

Note: *p<0.05 = Significant

**p>0.05 = Not significant

Table value of t for 30 samples at 5% level of significance (t.t) =1.699

Interpretation:

The descriptive statistics (Mean, Standard deviation and T-Value) for pain on comparing both Stretching and Taping for Pre and Post treatment are shown in the above table.

Table 2: Descriptive Statistics For Dorsi Flexion of Ankle On Comparing Stretching And Taping

Treatment	Pre-Test		Post Test		T- Value	P-value
	Mean	SD	Mean	SD		
Stretching	10.06	1.17	19.36	0.88	34.2	<.05*
Taping	10.86	0.86	20	0.12	58.14	<.05*

Note: *p<0.05 = Significant

**p>0.05 = Not significant

Table value of t for 30 samples at 5% level of significance (t.t) =1.699

Table 3: Unpaired “t” test for Stretching and Taping technique

Parameters	T- Value	Tabulated Value
VAS	2.175	1.645
ROM- DORSI	3.898	1.645
ROM- PLANTAR	1.918	1.645
Functional Activity	1.776	1.645

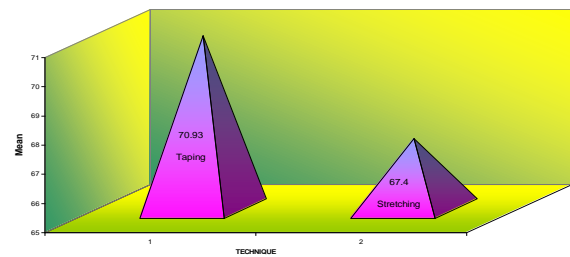
Interpretation:

The “T” value and Tabulated value for pain range of motion of dorsi flexion and plantar flexion and functional activity is calculated using Unpaired “t” test.

Interpretation:

The descriptive statistics (Mean, Standard deviation and T-value) for Dorsi flexion of the ankle on comparing Stretching and Taping for Pre and Post value are shown in the above table.

Graph 4: Comparison of Functional activity at week 8 between Taping and Stretching



Data Analysis

The Mean, Standard deviation and T-Value for pain on comparing Stretching and Taping for Pre and Post values are recorded in table-1; Taping is more significant than Stretching.

The Mean, Standard deviation and T-Value for Ankle dorsi flexion on comparing Stretching and Taping for Pre and Post values are recorded in table-2; Taping is more significant than stretching.

The Mean, Standard deviation and T-Value for Functional activity on comparing Stretching and Taping for Pre and Post values are recorded in Graph 1 Taping is more significant than Stretching.

The Table -3 shows the comparative data of both Stretching and Taping Technique. Analysis indicate that Taping is highly significant than Stretching.

5. Results

The statistical data for pain on comparing Stretching and Taping technique is recorded in table 1, that of passive range of motion of ankle dorsiflexion and plantar flexion are recorded in table 2 and 3, and functional activity is recorded in table 4 respectively. Analysis of the data shows that pain, passive ROM of dorsi flexion and plantar flexion and functional activity improved significantly from week 0 to week 8.

A Paired” t” test was used to calculate the Mean difference of the variables from week 0 to 8week. There was significant improvement in the pain, passive ROM of dorsi flexion and plantar flexion and functional activity of the ankle at week 8 when compared with week 0.

The comparison of significance of improvement of pain, passive ROM of ankle dorsiflexion and plantar flexion and functional activity between Pre and Post Stretching and Taping technique during 0 to 8 weeks was done with independent sample ‘t’ test (Unpaired ‘t’ test) (table 3).

The improvement of pain, passive ROM of ankle dorsiflexion and plantar flexion and functional activity on comparing the mean values was highly significant in Taping

during 8th week and less significant in Stretching during 8th week.

6. Discussion

Achilles tendonitis frequently causes the lower calf and heel pain. There are minor microscopic tears of the tendon resulting in pain, swelling and tenderness. The blood supply approximately 2 to 6 cm above the insertion into the calcaneum is poor, eventually the tendon begins to thicken and weaken. It is caused due to poor flexibility, poor absolute and endurance strength of the muscle attached to the tendon unit as causative factors in the development of tendon injuries as defined by **RENSTROM.P[4]**

The objective of the study was to find out the efficacy and to compare the effects of Stretching and Taping in Achilles Tendonitis.

It was found that stretching and taping technique decreases the strain of the Achilles tendonitis. This result accord with those of **SANDMEIER R, RENSTROM P[8](1997)**, who has shown that stretching the Achilles tendon has found to preserve the function of the musculotendinous unit by restoring normal ankle joint mobility and decreasing the strain of the Achilles tendon with normal action.

SMITH M ET A[9], who has demonstrated that taping to Achilles tendon reduces symptoms markedly and results in a 10-fold increase in pain free distance.

The improvement in pain was demonstrated by measuring the VAS scale, range of motion of ankle dorsiflexion and plantar flexion and functional activity. It is in accord with **KARIM M KHAN[7](2001)**, who has reported that three domains-pain, functional status and functional activity have. To be assessed in patients with Achilles tendinopathy and the VISA-A questionnaire is a valid and reliable index of the clinical severity of Achilles tendinopathy.

In this study 30 athletes in the age group of 18 to 30 years in two groups with the diagnosis of Achilles tendinitis underwent Stretching and Taping technique.

Taping and stretching technique are found to decrease the pain, increase ankle range of motion and improve the functional activity. Taping was found to increase the sensorimotor perception (proprioception) and also reduce the incidence of Achilles tendon injuries.

This result is shown by **FEILERS[10]**, demonstrated that tape stabilizes activates and influence proprioception.

Stretching was also found to be an effective technique in reduction of pain as it improves muscle compliance that reduces the risk of injury and increase in flexibility and decrease in muscle imbalance. **ROBBIM, WAKED AND RAPPAL[14]**, (1995) has demonstrated that ankle proprioception has been showed too enhanced by taping.

Jonas Ruberson [11], found that stretching and warm up did not demonstrate significant difference. **KUYUCU, BARIS GULENC[12]**, found Kinesiotaping was an effective

treatment modality to reduce pain. **FENG HUA TSA, L-HUACHU[15]**, also show to protect the Achilles tendon, AT-Achilles taping is recommended since it tends to decrease Achilles tendon force.

Taping technique improves the ankle range of motion with decrease in pain and improves the functional activity, as it is an effective tool for the relief of pain than Stretching. The length of soft tissue is increased and maintained for prolong period of time in Taping than Stretching. It is also a good alternative treatment to treat Achilles tendinitis and to increase ankle proprioception.

The treatment protocol for Taping technique to Achilles tendon is 8 hours for 6 days a week for 8 weeks.

The results indicate that the treatment program of both Stretching and Taping technique improves pain, passive ROM of ankle and functional activity. On comparing Taping is effective than stretching.

7. Conclusion

The results indicate that Taping to Calf muscle is more effective in decreasing pain, increasing passive ROM of ankle and improving sporting activity in Achilles Tendinosis.

The results also indicate that the improvement is more significant in Taping than Stretching on comparing the Pre and Post values between 0 to 8 weeks.

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