Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v30i19.3764

APPLICATION OF ICE PACKS, KINESIOLOGY TAPE AND STRENGTHENING EXERCISES ON ANKLE SPRAIN AMONG SPORTSPLAYERS. A SINGLE BLIND STUDY.

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Abstract

Background: -The most frequent lower limb injury among athletes is an ankle sprain. A general estimation that ankle injuries occurs about 1/10,000 times every day. A big part of sprains affects the lateral tissues.

Methodology :-30 subjects were included in the study , group A kinesiology tape with ice packs, group B strengthening exercise with ice packs, treatment ice packs with kinesiology tape is used to stabilize the joint for group A ,and group B strengthening exercise with ice packs were given , initially kinesio-tape were applied for 3 days a week and removed and ice packs were given to subjects for 15 minutes and again reapplied to the ankle joint kinesio-tape were applied for another 3 days a weeks for 30 days treatment protocol, 10 repetition strengthening exercise given ,total treatment period 35 minutes.

Result:-Kinesiology tapewith ice packs gives better result as compared to strengthening with ice packs ,Pain ,Swelling decreases ROM and strength Increases inversion ROM on the initial day i.e. 0 day was 8.7533 & on the follow up days i.e. 45thday the inversion range was found 28.60, planter flexion of the group A on the 0 day was13.2867 & on the follow up i.e.; 45th day the planter flexion also increases up to 43.72,Dorsiflexion of group A on the initial day i.e.;
0 day was 2.92 and after the follow up days i.e.; 45th day was 18.58. Significance P Value 0.001

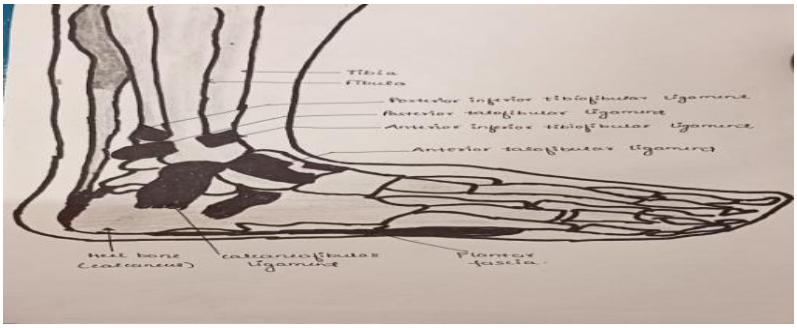
Conclusion:- Pain decreases in both group, but the kinesio-tape with icepacks produce better result in comparison to strengthening exercise with ice packs, significance, P value 0.0001

Keywords: Ankle sprain, kinesio-tape, ice packs, strengthening exercise, Theraband.

INTRODUCTION

The most typical lower limb injury among sports celebrities is an ankle sprain.[1,2].A general estimation that ankle injuries occur about 1/10,000 times every day has reported in published article[3,4]. Sprains seem to be the most common type of ankle injury, accounting for 85 percent of all disorders. A big part of sprains affects the lateral tissues[5]. Apart from bony and muscular component various ligament lateral, medial and syndesmotic provides stability[6]. Existing research accepts thatdespite the higher reliability, an early ankle sprain seems to have a poor long-term outcome, with many patients dealing with chronic persistent pain[7, 8] and injury repeitions[6,9]. The

recurring of an ankle sprain results in ankle instability, which is frequently coupled with pain and dysfunction, and poor reflexes[10]. Acute ankle trauma accounts for 10-30% of athletic ailments in high school athletes[11]. For nearly 6 years in the National Football League, the ankle was implicated in more than 10percent of period injuries[12]. The most frequent form of ankle problem is lateral ankle sprains[13, 14]. Several people in sports experience lateral ankle sprain[15]. Despite being considered a minor injury, LAS leads to pain, a period away from games or work, and, most importantly, negative experiences to recurring sprains[16].As an outcome, a reliable tactic for avoiding ankle sprain is essential[17]. As per current studies, a considerable rotation motion along the axis of the subtalar joint produces lateral ankle ligament damage[18]. A lateral ligament injury accounts for about 85% of all ankle sprains, a separate anterior talofibular ligament injury accounts for 65%, and a combined anterior talofibular ligament and calcaneofibular ligament injury accounts for 20% of all ankle sprains. [19,6]. The additional 15% of ankle sprains are medial and syndesmotic[20, 6]. An ankle sprain is described as an injury caused by a shear strain that produces stretching, partly ripping, or full ripping of a ligament[21]. Musculoskeletal injuries are common among sportsmen and the general populace[22].Inversion injuries are much more common because of medial ligaments are stronger than to the lateral ligaments[23].Ankle injuries are classified in 3 groups: sprains, strains, and fractures. Grade 1 refers to a little ligament tension with no joint instability; grade 2 refers to a partial ligament rip with moderate joint instability; and grade 3 refers to a total ligament tear with joint instability[24]. Ankle sprains are graded 1 through 3 in complexity[25].For the first time it was reported that in 1970s by the Japanese chiropractor sir K.Kase[26]. The main function of the kinesio-tape is to stabilize the muscle and the joints post injury, kinesio-tape also provide the space beneath the skin for the blood supply, kinesio-tape is a water defiance and is air-permeable and it can be used for no. of days without erasing the tape from the skin[27]. Kinesio-tape also provides improvement of muscles strength by supporting the weak muscles and ligaments reducing pain and inflammation increase the blood and lymph flow, increasing ROM of the joints and Kinesio-tape also provides stability to the disordered muscle fibers and joints[28,29].Zack M Slevin et.al has found in his research effect of kinesiology taping on ankle stability, he found by using kinesiology taping no significant difference was there but HYyun-Do Seo et. al has found that kinesiology taping has a significant effect in the prevention of ankle sprain. Cryotherapy was first evolved by Pursey in year 1908[30]. Main aim of cryotherapy was to lower the body surface temperature. Cryotherapy aids in the heat dissipation from the surface or the affected area[32]. Inflammation, erythema, or a rise in temperature will occur in the affected area. Using a cold pack or cold water will cause veins to contract, causing heat loss from the surface. Inflammatory release and other signs are caused by heat loss[33].



Classification of Ankle Sprain

Grade 1 - A ligament is partially torn:-

Slightpain and inflammation

Almost no cognitive loss or only little functional loss

Physical instability doesn't exist

Grade 2- A partial ligament tear with moderate functional impairment.

Modest pain and swelling
Slight to mild ecchymosis
Compassion for the implicated structures
It is predicted that certain movement and efficiency will be lost
Patients with mild instability
Grade 3- A ligament has been completely torn apart and its integrity has been lost.
Significant inflammation
Extreme ecchymosis coupled with ecchymosis
Due to the damage, both movement and activity are lost
Physical trembling.

ANATOMY OF ANKLE JOINT

A hinge-type synovial joint is the ankle joint. The medial malleolus of the tibia, the lateral malleolus of the fibula, and the inferior transverse tibiofibular ligament make up its upper articular surface. The inferior articular surface is made up of the articular regions on the top, medial, and lateral portions of the talus. The joint has a robust structural foundation. The following factors support the stability of the joint: .(1) A tight fit between the articular surfaces (2) Lateral collateral ligaments that are strong(3) The tendons that crosses the joint are four in front and five in back. The Ankle joint is supported by three things (1) The articular border is linked to the joint's fibrous capsule, which has two components. Second, it is connected to the dorsum of the neck of the talus at a distance from the trochlear surface anteriorly and inferiorly. First, it is connected to the inferior transverse tibiofibular ligament posteriorly and superiorly.(2) **The Deltoid and Medial ligaments.** These very robust, triangular ligaments, which are separated into superficial and deep sections with a shared attachment over the apex and borders of the medial malleolus, are located on the medial side of the ankle joint. Three fibers make up the superficial sections. The medial edge of the spring ligaments and anterior fibers (Tibionavicular), which are attached to the navicular bone, The final is medial fibers (Tibiocalcanean), which are attached along the entire subtenticulumtali length. The medial tubercle and a portion of the medial surface of the talus are attached to the posterior fibers, also known as the posterior tibiotalar. The anterior portion of the medial surface of the talus is where the Deep section is attached. (3**) A Lateral ligament** There are three bands. (1) The Posterior Talofibular Ligament runs from the lower portion of the malleolar fossa of the fibula to the lateral tubercle of the talus. It is flat in shape and connects the anterior margin of the lateral malleolus to the neck of the talus, immediately in front of the fibular facet. (3) The calcaneofibular ligament has a long, rounded cord that extends from the tubercle on the lateral side of the calcaneum to the notch on the lower border of the lateral malleolus. There is only one axis of movement in a hinge joint which allows for dorsiflexion (50 deg) and plantar flexion (20 deg).The ankle joint is stabilized by both passive and dynamic mechanisms. The articular surface, the articular capsule and the surrounding ligamentous complexes and retinacula all play a role in passive stabilization. Muscle activation is the only source of dynamic equilibrium.

MATERIAL AND METHOD

I have taken 40 subjects for the research out of which 10 subject withdraw from the research who had intended the participant in my research. The total subjects were divided into two groups.15 subjects were allocated to a group A and other 15 were allocated in Group B. Group A will receive ice packs, and strengthening exercises(We strengthen using Therabands, undertake active ankle range of motion exercises, and oppose dorsiflexion, plantar flexion, inversion, and eversion.) and Group B will receive ice packs with kinesiology tape. Consent was taken from the participants and the participants were informed about the consequences of research. The subjects were taken after the ankle joint injury which is only diagnosed by aorthopaedic surgeon. Total study time is 6 weeks. For diagnostic method we use anterior drawer test, talar tilt test and VAS Scale for pain (Numerical value) at 0 day, 15 days, 30 days and 45 days. Total time for the treatment is 35 mins in a day for 5

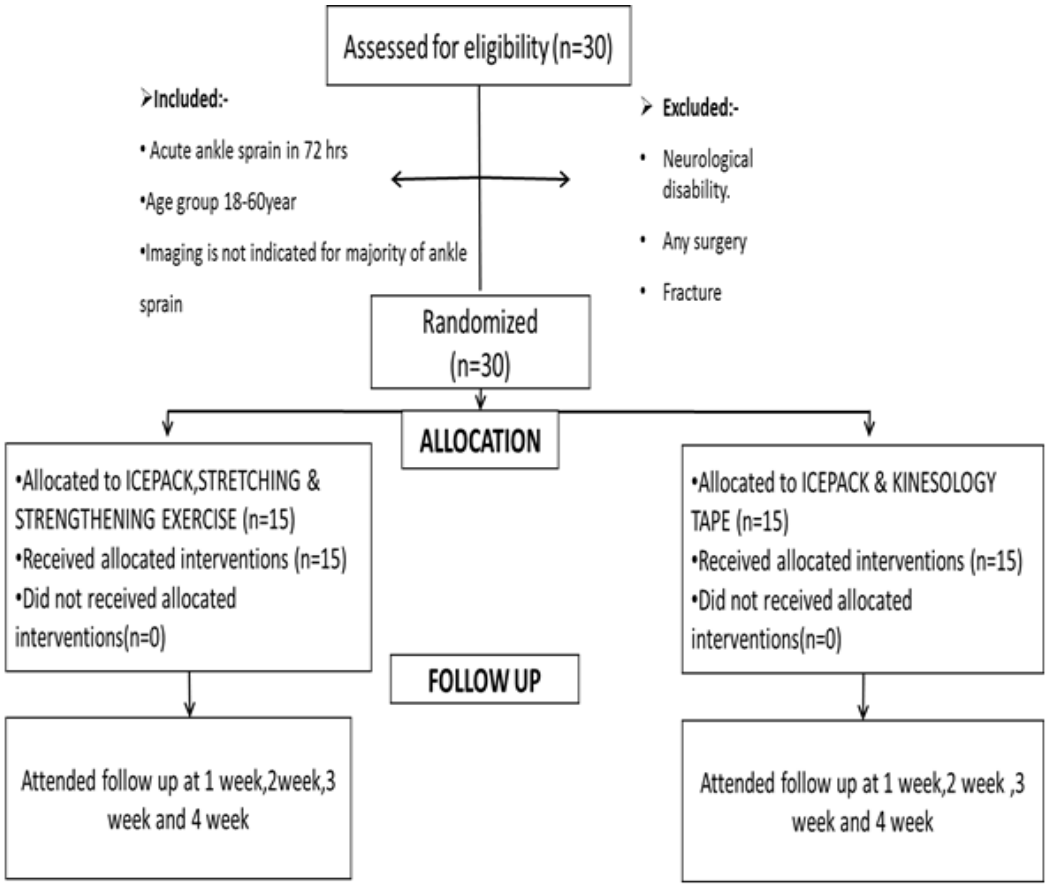
days a week. Application of KT tape for alternate days for 3 days a week and continues to 4 week and after 4 weeks home exercise program was prescribed to the subject (ball pressing, standing soleus stretch, heel raises, ankle- toe movement) Initially we have used ice packs for 3 days and after 3 days we had used light stretching exercises and passive strengthening exercises of the ankle joints and strength was measured by dynamometer. The subjects for the study was taken from the Jain Arogyam Physiotherapy Clinic .Demographic data were taken age, weight, height, BMI, Data will be analyzed by the t-test.

Inclusion criteria:-

1. Participants has experienced acute ankle sprain in 72 hrs (3days)
2. Age group 18 years - 35 years.
3. Both Genders
4. Grade 1 ankle sprain
5. Imaging is not indicated for majority of ankle sprain cases.

Exclusion criteria: -

1. Neurological disability
2. Any surgery
3. Fracture tarsal & metatarsal
4. Surgery at knee and ankle



Application of Kinesio-tape at the ankle injury site for the restriction of the micro soft tissue movement and also stabilize the ankle joint.

Fig 2; Measuring the ROM of the Ankle joint with Goniometer

Fig no 3. Application of ice packs at the injury site

Fig no 4 :Passive strengthening exercise of the ankle joint.

Fig no 5;Self strengthen exercise Theraband ankle strengthening exercise

Fig no 6 :using the Sphygmomanometer for measuring the strength of the ankle joint muscles.

Demographic Data Analysis

Using T-Test for demographic data analysis. Group A

Table 1 no 1

Variables	Average N=15	T Value	P value
Age	22.53	2.05	0.024543
Height	5.57	0.6167	.271208 Non significant
weight	63.53	-1.69149	.050923 Non significant
BMI	21.96	1.90604	.033479

Group B Demographic Data

ANOVA is used for **VAS** Analysis for comparative analysis for Both group A & B on O Day, 15 day,30th day.

Table no 3

Variables	0 day Average mean n (15)	15 days Average mean n (15)	30 days Average mean n (15)	Level of significance
VAS groupA (Kinesiology tape group)	8.9133	5.0933	1.0933	0.00001
VAS group B (strengthening exercises)	8.8067	6.02	1.1533	0.00001

Table 3 shows that there is decrease pain as compared from 0 day 8.9133 to on 30th day Pain 1.0933, P value 0.0001.

Comparative Data analysis of Dorsiflexion of Ankle both group A & B using ANOVA Test Table 3 **(Dorsiflexion)**

Variables	0 day Average mean (N=15)	15 days Average mean (N=15)	30 days Average mean. (N=15)	45 days Average mean Follow up (N=15)	Level of significance
Dorsiflexion group A (kinesiology)	2.92	11.92	16.49	18.58	0.00001
Dorsiflexion group B (Strengthening exercises)	2.82	11.84	16.16	17.78	0.00001

Both the group showing significance improvement in dorsiflexion in Kinesiology groupA as compared to group B.

Comparative Data analysis of Planter Flexion of Ankle both group A & B using ANOVA Test

Table No 4

Variables	0 day Average mean (N=15)	15 days Average mean (N=15)	30 days Average mean. (N=15)	45 days Average mean Follow up (N=15)	Level of significance
Planter Flexion Group A (Kinesiology)	13.2867	31.9067	40.8	43.72	0.00001
Planter Flexion Group B (Strengthening)	12.7133	23.6533	39.22	40.32	0 .00001

Comparative Data analysis of inversion of Ankle both group A & B using ANOVA Test

Table No 5

Variables	**0 days**	**15 days**	**30 days**	**45 days**	**Level of significance P value**
Inversion Group A	8.7533	21.56	26.60	28.60	0.00001
Inversion group B	8.88	19.59	24.65	27.8	0 .00001

Comparative Data analysis of Eversion of Ankle both group A & B using ANOVA Test

Table No 6

Variables	**0 days**	**15 days**	**30 days**	**45 days**	**Level of significance P value**
Eversion Group A	2.92	11.5	16.74	18.58	.00001
Eversion group B	2.84	11.41	16.20	17.63	<.0001

Comparative Analysis of strengthen group of A & B ie Kinesiology & strengthening group using ANOVA analysis.

Table 7 for, **Strength Group A & B**

Variables	**0 days**	**15 days**	**30 days**	**45 days**	**Level of significance P value**
Kinesiology Group A	21.1 mmHg	40.1mmHg	58.6mmHg	60.86mmHg	0.00001
Strengthening group group B	21.5 mmHg	39.5 mmHg	53.4 mmHg	55.6mmHg	0.00001

- **There was marked strengthen in both group A & B, but significant improvement strengthens found in the Kinesiology group A as compared to the strength group.**

DISCUSSION

This study looked at the effects of strengthening exercises, kinesiology tape, and ice packs on ankle sprains. Ankle is a very common joint that is crucial to many activities of sports. Ankle sprain are common problem in general population as well as sports personalities. Incidence figures 1/10,000 times every day have been reported for different age groups. When a tensile force produces stretching, partial tearing, or full ripping of a ligament, an ankle sprain is the result .Comparing the effects of 4 weeks of cold packs, kinesiology taping, and strengthening training was the study's main objective. (whereas, ice packs are common in both the groups) in athletes with acute ankle sprain. We have looked at the effect of ice pack with strengthening exercises and ice pack with kinesiology taping separately. Some studies have compared the effect of two types of icing protocols. Therefore C M Bleakyet.al (2006)found that intermittent ice application have been shown to be effective in reducing ankle pain during activities of patients with ankle sprain. Hyun-Do Seo et.al (2016) reported that kinesiology taping has a significant effect in the prevention of ankle sprain. Zack M Slevinet.al (2020).This researcher did not agree with the result of Hyun-Do Seo et.al He found that kinesiology taping has no significant effect on prevention as well as treatment of Ankle sprain.. Kinesiology tape helps in providing stability in ankle also reduces pain and swelling. In my studies it helps us a lot. Ki-Jong Kim, et. al (2014)An investigation was done to determine the impact of strengthening, combined strengthening or proprioceptive exercises which have greater effect on ankle instability. They found that alone strengthening exercises is not much effective in ankle instability. Brent I. Smith, MS, ATC et.al (2012). They compare 6-weeks strength training and force sense on functional ankle instability. The researcher did not agree with the result of Ki-Jong Kim, et.al. (2014). He found that strengthening exercise has a significant effect on functional ankle instability. As in my study it was observed that the ankle muscle strength increase with strengthening exercise along with application of kinesio-tape and ice packs, on the 0 day muscle strength was 21.1mmHg and on the 30 day the ankle strength was observed 58.6 mmHg and on 45 day after home exercise protocol ankle muscle strength was observed 60.86mmHg, muscles strength was measured by using dynamometer .When it come to Pain the VAS Pain score in Kinesiology tape with Ice Pack on 0 day was 8.9133 and on 30 day it was 1.0933 so there is significant decrease in the pain in kinesiology tape with ice pack as compared to strengthening exercise with ice packs. Ankle Eversion on the 0day was 2.92and on the 45^{th} day range was found to be 18.58 on the kinesiology group ,inversion ROM on the initial day i.e. 0 day was 8.7533 & on the follow up days i.e. 45thday the inversion range was found 28.60, planter flexion of the group A on the 0 day was13.2867 & on the follow up i.e.; 45^{th} day the planter flexion also increases up to 43.72, Dorsiflexion of group A on the initial day i.e.; 0 day was 2.92 and after the follow up days i.e.; 45^{th} day was 18.58. Range of motion also increases as the treatment progress as in my case we found that ice pack with kinesiology tape had a greater effect than ice pack with strengthening exercise. In my study ice pack with kinesiology tape group reported less pain and increased range of motion than ice pack with strengthening exercise group during the study. Pre, Sub and Post treatment findings for both the groups were statistically significant(P Value 0.05) suggested that both ice pack with kinesiology tape and ice pack with strengthening exercise both had a considerable effect on Acute ankle sprain.

CONCLUSION

It was concluded that there was decrease of pain with kinesiology taping & ice packs produce better effects as compared to strengthening exercise with ice packs at the ankle joint.

Conflicts of Interest: There is no conflict of interest of the researcher

Funding: There was no any funding of the research from the funding agencies, it was a self-funded research project.

Ethical clearance from the ethical committee of the Galgotias University.

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