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DIRECT EFFECT OF ELASTIC ADHESIVE WITH CORRECTION TECHNIQUE AND MUSCLE FACILITY ON DYNAMIC BALANCE IN CHRONIC ANKLE INSTABILITY INJURY AT PARAPAT HOSPITAL

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Abstract

To seethedirecteffectofkinesiotape (KT) with correction and facilitation techniques after ten minutes of dynamic balance using the star excursion balance test (SEBT) on chronic ankle instability injury (CAI). Subjects: 111 subjects were divided into group 1 correction techniques (n = 21), group 2 facilitation techniques (n = 26), andgroup 3 controls / normal (n = 64). Quasi experimental randomized controlled trial by testing the SEBT percentage pre-postgroup 1 andgroup 2, and testing the SEBT percentage after 10 minutes in groups 1 and 2 compared to the normal 3-ankle group. Result: paired sample t- testpre (87.62% ± 9,631) and post (98.14% ± 10,556) group 1 p = 0,000 (p <0.005) there is difference of dynamic balance, paired sample t-test pre (90, 12.5% ± 8,529) and post (96.5% ± 14.049) group 2 p = 0.015 (p < 0.05) there is difference of dynamic balance, independent sample t-test post group 1 and group 2 p = 0.659 (p> 0.05) and ANOVA group 1, group 2, & group 3 (95.13% ± 11.31) p = 0.585 (p> 0.05) there is no difference of dynamic balance. Both techniques of KT on ankle have a neuro-physiological effect on dynamic balance same US normal ankle.

Keywords : Chronic ankle instability, kinesiotape, dynamic balance. sports injury

INTRODUCTION

Ripped ligaments lateral joints Ankle pain is most often experienced by active athletes. Impairment in this ligament structure will cause sign And symptom like flavor pain, swelling, and feeling of loose or unstable joints (Kobayashi and Gamada, 2014). Athletes who have experienced this injury are at risk of re-injury. symptoms Which No visit Good
(Bonnel et al., 2010). Some opinions suggest that this injury occurs after repeated injury

more than twice and the injury lasts more than 3 months (Gribble et al., 2014).

A data explains that during the 11 years of the UEFA Champions League there were 1080 incidents of ankle injuries with a ratio of 0.7-1/1000 hours (Walden et al., 2013). Lateral ankle sprain Sprain is injury ligament Ankle injuries are most common in athletes, with an incidence rate reaching 20%-40% in various sports (Walden et al., 2013, Sawkins K, 2007). Ankle injuries are more common in women and children who actively participate in team sports.

Subjective complaints from several athletes with a history of ankle injuries include persistent pain and looseness in their joints during training and competition (Donovan and Hertel, 2012). Some experience recurrent injuries, while others experience no complaints. Several studies have shown that chronic ankle instability (CKIPK) is caused by instability of the ankle joint during movement. There are two types of joint instability: mechanical stability and functional stability (Giannini et al., 2014; Kobayashi and Gamada, 2014).

Individuals with CPIPK will experience joint hypermobility and hypomobility, hypermobility due to decreased control of joint stability and hypomobility due to changes in the position of the arthrokinematics of the talocrural and tibiofibular joints. distal (Hoch and Grindstaff, 2012, Hubbard and Hertel, 2006). The hypomobility that occurs is characterized by limited dorsal flexion and joint movement. around wrist foot. Limitations This will reduce the function of joint mechanoreceptors and proprioceptors, inhibition of muscle contraction, static and dynamic postural control, and gait patterns which have an impact on repetitive injuries (Hoch and Grindstaff, 2012).

The results of observations with x-rays on individuals with CPIPK and sub-acute sprains indicate that there is indeed a shift in the fibula bone against the anterior tibia (Hubbard et al., 2006 , Hubbard and Hertel, 2008). Besides tibiofibular distal bone talus Also shifted anteriorly, this causes pain on the anterior side of the ankle, makes it difficult to move dorsal flexion and makes it easier for the ankle joint to be in the plantar flexion and inversion positions (Wikstrom and Hubbard, 2010).

Based on the explanation in the paragraph above, there is a need for elastic adhesive techniques that can improve the position of the fibula and talus bones and the work of mechanoreceptors to improve dynamic balance and reduce joint laxity during exercise. According to Kumbrink (2012), there are four techniques for using elastic adhesive,

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namely facilitation muscles, ligament correction, bone position correction, and lymphatics. In this study, the techniques used are ligament and bone position correction. wrist feet. Researchers It is hoped that this technique will improve the functioning of sensory functions, mechanoreceptors which will increase joint proprioception so that the joints become stable and dynamic balance increases.

KT will alter muscle tone and help control muscle function by activating subcutaneous mechanoreceptors, which regulate sensory feedback stimuli in the fascia and muscle layers. This feedback will provide a proprioceptive response, sending information to the central nervous system (CNS) and then back to the peripheral motor system to control muscle tone, both facilitating and inhibiting according to needs and desired stimuli. In addition, for several pathologies, caused by by control autonomous, KT must be able to provide information via mechano-receptors to the hypothalamus so as to provide global tone control stimulation (Seo et al., 2016, Chang et al., 2015). (Figure 1)

Picture 1

Influence feedback adhesive elastic (kinesiotape) on mechanoreceptors

For see influence technique This, researchers will compare it with the elastic adhesive technique used by Bicicietal (2012) and observe normal function with dynamic balance values in healthy ankles. The measuring tool used to observe this dynamic balance is the Star Excursion Balance Test (SEBT).

LITERATURE REVIEW

Injury Chronic Instability Chronic Ankle Instability (CAI)

Lateral ankle sprain injury (Lateral Ankle Sprain) is a injury ligaments legs the most frequent bottom experienced by athletes , with number incident reaching 20%-40% in various branch sports (Walden et al., 2013). The tear structure ligaments This cause signs and symptoms such as pain , swelling , and joint pain slack or No stable . Individuals who experience injury repeat (more from twice in time more from 3 months) often develop become Injury Chronic Instability Ankle (CKIPK). CKIPK is caused by instability joints Good in a way mechanic and functional . Individual with CKIPK will feel :

Hypermobility : Decreased control stability joints .

Hypomobility : The presence of change position arthrokinematics distal talocrural and tibiofibular joints . Hypomobility This characterized by limitations movement dorsal flexion which ultimately lower Work mechanoreceptors and proprioceptors joints , inhibit contraction muscles , as well as lower static and dynamic postural control . Shifting Bone (Positional Fault): Observation x-ray show existence shift fibula bone against tibia anterior direction , as well as displaced talus bone to the anterior, making it easier joints in plantar flexion and inversion positions (Hubbard et al., 2006; Wikstrom & Hubbard, 2010).

Kinesiotape (Adhesive) Elastic)

Kinesiotape (KT) is used as intervention For repair position bones (such as the fibula and talus) as well increase function Work mechanoreceptors . According to Kumbrink (2012), there is four technique main use adhesive elastic , where research This focus on two technique :

Correction Techniques : Used For correcting ligaments and maintain position bones (eg maintain position fibula bone).

Facilitation Techniques Muscle : Attached to muscles (e.g peroneous longus and brevis)

for facilitate Work muscles and provide prisoners .

Mechanism Neurophysiological Kinesiotape :

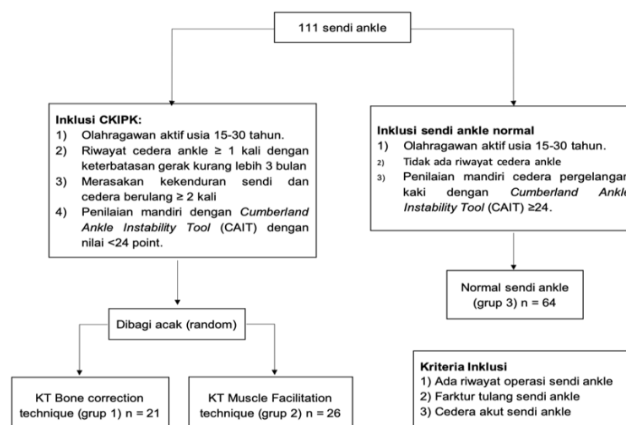
KT can change muscle tone and help control Work muscle through activation mechanoreceptors subcutaneous in the fascia and layers muscle . Stimulation This give bait come back (sensory) feedback to proprioceptors , which then send information to Central Nervous System (CNS). The CNS will return signal the to system motor peripheral For control muscle tone (facilitate or inhibit) use stabilize joints ankle (Seo et al., 2016).

Balance Dynamic and Star Excursion Balance Test (SEBT)

Balance dynamic is ability body For maintain position or posture moment do movement . In CKIPK sufferers , damage somatosensory cause failure bait back to motor / efferent stability joints ankle , so that balance disturbed .

For measure and evaluate balance dynamic member movement lower as well as risk injury repeated , used instrument tested measurement namely the Star Excursion Balance Test (SEBT) . adhesive elastic functioning as control external that provides perception stability , stimulating adaptation neurophysiology , and improve automation control motor so that mark balance dynamic moment measured using SEBT can increased , resembling condition normal ankle .

METHOD



Picture 2

Chart taking sample

One hundred and eleven (111) feet that were observed were obtained from students at the Ragunan Jakarta Student Sports Education Center (PPOP) who were divided into three (3) groups with the inclusive criteria of normal/healthy feet. active man And woman 15-20 years, has no history of ankle injury and knee, evaluation independent injury ankle with Cumberland Ankle Instability Tool (CAIT) ≥24, while the group with CKIPK conditions Active male and female athletes aged 15-20 years, have a history of ankle injury more than once (≥1 time) with inflammation and limited physical activity, have felt loose/shaky more than 2 times in the ankle joint and recurrent injury without any signs of new inflammation, self-assessment of ankle injury with the Cumberland Ankle Instability Tool (CAIT) <24. Subject exclusive criteria Have a history of musculoskeletal surgery including bones, ligaments, muscles, and nerves around the ankle joint. joints wrist foot, own history of ankle fracture, acute musculoskeletal injury (spain, strain, And fracture) in term time three month during inspection.

Group treatment shared in a way random

(randomized control trial) with the result that twenty-one feet (21) with CKIPK were included in group one with elastic adhesive given. technique correct, two tens six (26) legs with CKIPK given elastic adhesive facilitation technique, and sixty-four legs (64) healthy or without CKIPK were not given intervention. (figure 2)

Instrument

Measurements using the Star Excursion Balance Test (SEBT) were carried out before giving adhesive elastic And after

The elastic adhesive was applied for 10 minutes in both intervention groups. Measurements were taken at any time in the healthy leg group.

Procedure

a. Elastic adhesive correction technique Using four pieces of elastic adhesive paired on bone area fibula use maintain the position of the fibula.

b. Elastic adhesive facilitation technique Using three pieces of elastic adhesive that Enough long And mounted on muscle peroneous longus And brevis and given prisoners on anterior ankle. (Figure 3)

Picture 3

Technique Facilitation (Bicici, et al, (2012)

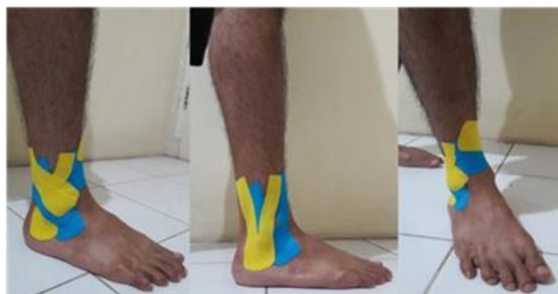


Figure 4 Technique Correct Fibula

RESULTS AND DISCUSSION

The effect of dynamic balance found in each sample before (pre) and after (post) given elastic adhesive with correction technique was tested using paired sample t-test. The results showed that there was a difference in dynamic balance value p = 0.000 (<0.005). Explaining that there was a difference in dynamic balance before and after being given elastic adhesive correction technique in chronic ankle instability injury (CKIPK). Meanwhile, in group 2, elastic adhesive muscle facilitation technique was given and then tested using paired sample t-test. The results showed that there was a difference in dynamic balance value p = 0.015 (<0.005). Explaining that there was a difference in dynamic balance before and after being given elastic adhesive muscle facilitation technique in chronic ankle instability injury (CKIPK). (Table 1)

Table 1

Group	Sample (n)	Mean±sd (%)		p
		Before	After	
Group 1 (bone position correction technique)	21	87,62±9,631	98,14±10,556	0,000 (p<0,05)
Group 2 (muscle facilitation technique)	26	90,12±8,529	96,5±14,049	0,015 (p<0,05)

Results before And after using elastic adhesive (paired sample t-test)

The effectiveness of both elastic adhesive techniques was tested using an independent sample t-test. The results showed a difference in dynamic balance values of p = 0.659 (> 0.005). This explains that there is no difference in dynamic balance between the elastic adhesive correction technique and the muscle facilitation techniques in chronic ankle instability injury (CKIPK). It can be interpreted that these two techniques can be given to this injury.

The benefits of these two elastic adhesive techniques will be compared with the SEBT values of normal ankles tested using ANOVA. The results showed that there was no difference in dynamic balance values p = 0.539 (> 0.005). This explains that the use of this elastic adhesive provides the same dynamic balance effect as a normal ankle. (Table 2) .

Table 2 Test ANOVA

Perlakuan	Rerata±sd (%)	F	p
Grup 1 (Bone Correction Technique) (n=21)	98,14±10,556		
Grup 2 (Muscle Facilitation technique)(n=26)	96,5±14,049	0,539	0,585
Grup 3 (Normal Ankle) (n=64)	95,13±11,31		

Based on the results found regarding the influence balance dynamically using SEBT is in line with the research report by Tamburella, et al (2014) which explains the use of elastic adhesives For 48 hours in neurological cases, it can improve balance in spinal cord injuries, spasticity, and gait patterns. According to him, this elastic adhesive increases sensory input by providing a reciprocal response to proprioception and controlling muscle tone (Tampurella et al., 2014). Cortesi, et al (2011) also reported that in cases of multiple sclerosis, applying elastic adhesive to the ankle will improve body movement control, exteroceptive-afferent activity, and motor excitability in the soleus muscle when standing on one leg with eyes closed. The use of elastic adhesive on the ankle can also improve body posture (Cortesi et al., 2011). Both reports explain that elastic adhesive

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(kinesiotape) has an effect on the body's neurophysiological function so that in the affected area become the target of using the stability function to increase.

Jo-Kim etal (2015) &Faysonetal (2015)

explains that the use of elastic adhesive can help improve the function of joint structures so that athletes with CKIPK can feel more stable joint awareness. Also followed by Mohamedetal (2016) who explained that the elastic adhesive given in first-degree ankle injuries accelerates functional recovery.

In this study, there was no difference in SEBT values between group 1 (technique) correct) 98.14 ± 10,556, group 2 (technique

facilitation) 96.5 ± 14,049 And group 3 (normal)

95.13 ± 11.31 (graph 1). Both adhesive techniques used give repair balance is equivalent to normal ankle balance. Park and Lee (2016) explain giving adhesive elastic on 12

Hemiplegic stroke patients with decreased body and motor coordination can improve their ability to walk straight. Improved body and motor coordination after using elastic adhesive may be caused by afferent stimulation of mechanoreceptors in the skin that provide feedback to efferent responses in the muscles, thus the work of the fusimotorcutaneous reflex and gamma motor fibers will increase muscle fiber tension and body motor control (Kim et al. al., 2014 , Park and Lee, 2016). William et al (2012) in his meta-analysis report explain that influence elastic adhesive can be used as an effort to prevent recurrent injuries even though the resulting motoric improvements increase not too big (Wilson and Bialocerkowski, 2015).

The effect of elastic adhesive found in this study can be concluded that there is a basic physiological need of the body for somatosensory damage so that it does not provide feedback on the efferent/motor stability of the ankle joint which is at risk of repeated injury (Williams et al., 2012, Mohamed et al., 2016). The elastic adhesive provided on the ankle joint in this study can be used as a control external as a perception to be able to increase neurophysiological stimulation in the ability to automate motor control of dynamic balance at CKIPK (Lemos et et al., 2017).

CONCLUSION

CKIPK is an ankle injury that often occurs in athletes and carries a risk of recurrent injury. Use of the Cumberland Ankle Instability Tool (CAIT) can as tool Help determine the diagnosis of CKIPK so that the determination of the therapy program becomes more precise. Dynamic balance with SEBT can be used as a benchmark to observe motor control of the lower limbs and to assess the risk of recurrent injury. on wrist foot. Implications Clinically, elastic adhesive can be applied before athletes/sportspeople train or compete to provide a sense of stability to the ankle joint.

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