J Int Acad Phys Ther Res 2017; 8(2): 1163—1167
ISSN 2092-8475

www.iaptr.org
https://doi.org/10.20540/JIAPTR.2017.8.2.1163

Effects of Kinesio-taping on Balance Abilities and Proprioception Sense

The purpose of this study was to compare the effects of Kinesio taping in each area of the ankle versus the knee to improve balance abilities and proprioception sense. The healthy twenty eight students were divided into two groups, Group A and B. Ankle taping was applied to Group A, and knee taping was applied to Group B. In the ankle taping group, significant increase of dynamic balance abilities was appeared in the forward, left ward and right ward ($p<.05$). In the knee taping group, there was significant increase of dynamic balance abilities in the forward and left ward ($p<.05$). There was no significant increase of static balance abilities in both groups. In both groups of ankle and knee taping, there was significant increase of proprioception sense. These findings suggest that ankle and knee taping was helpful for improving dynamic balance abilities and proprioception sense.

Key words: *Kinesio Tape, Balance, Proprioception*

Sung Hak Cho[a], Hyun Ju Moon[b]

[a]Kaya University, Gimhae; [b]Gimhae hansol rehabilitation hospital, Gimhae, Korea

Received : 25 March 2017
Revised : 26 April 2017
Accepted : 07 May 2017

Address for correspondence
Hyun Ju Moon, PT, MS
1506Ho 205Dong, (Hanil Unl)89, 5 Gusan-ro, Gimhae, Korea
Tel: 82-10-7663-6235
E-mail: pulhanpogi2@naver.com

INTRODUCTION

Many clinicians have made various efforts to increase balance abilities. Clinicians have attempted various exercises such as closed and open kinetic chain exercises [1),2),3)]. Exercises based on Pilates and exercises focusing on muscular strength have applyed to increase balance abilities [4),5)].

Recently, methods of using Kinesio tapes to improve balance abilities are administered widely [6),7),8)]. As taping is a simple method that can be applied in a cheap price with few side effects, it has become one of the favored treatments among clinicians.

Balance abilities can be divided into static and dynamic balance abilities [9)]. Static balance ability is the ability to maintain balance in the base of support while not moving, and dynamic balance ability is the ability to maintain the center of gravity while moving in the base of support [10)]. It is also shown that proprioception, which is the ability to perceive the position of the body within a space, has an important impact on balance abilities11).

But, when appling Kinesio tape, we did not know effective area for improving of balace ability and position sense.

Therefore, the purpose of this study identify which area is more effective applying methods to Kinesio taping on the ankle versus on the knee for improve balance abilities and proprioception sense.

METHODS

Subjects

Twenty eight participants, who have not experienced any damage in the knee or the ankle within the last 1 year, were recruited by posting an announcement of recruiting experiment subjects in K University in Gimhae. The healthy twenty

eight students were assigned into Group A and Group B. The researcher conducted measurements by administering ankle Kinesio taping in Group A and knee Kinesio taping in Group B. Written informed consent has been obtained from each subject. This study was approved by the Ethics Committee of the Kaya University (Kaya IRB-79).

Methods

Each group was performed Kinesio taping on the ankle and the knee. For the ankle taping in A group, the taping started at the medial malleolus of the ankle, wrapped round the heel and then stopped at the lateral malleolus. In the case of the knee taping in B group, Y-shaped taping was administered at the femur part while maintaining the knee bent. In both cases a 5cm wide kinesio tape was administered. The measurement of static and dynamic balance abilities was conducted using Biorescue(RM INGENIERIE, Rodes, France), a tool measuring balances. In order to measure the static balance ability, each participant stood bare feet on the force platform with an outline of the bottom surface of the feet, and the measurement was made for the total COPL (center of pressure length) for 30 seconds. The results of the static balance ability are assessed by 5 values: trace length, C90 area, C90 angle, STD velocity, and velocity. Trace length is the length of COP line, i.e. the value calculated by totaling up all the lineal distances of the position variation per 0.2 second for the movements of points in COP. C90 area is the area of the sway line calculated in 90% confidence level of COP line. C90 angle is the angle between the major axis of C90 ellipse and the horizontal line, i.e. the angle of the main axis connected to the lateral direction in the center. STD velocity is the standard deviation value for the velocity of COP. Velocity is the mean velocity value calculated by dividing the trace length while experimenting in the average velocity of COP. The lower values in relation to the static balance ability mean that the shaking range is smaller and are interpreted as the better balance ability. The measurement of dynamic balance ability started in the same position with that of static balance ability test. Subjects stood on the force platform maintaining the balance, and their maximum abilities to lean the body forward, backward, leftward and rightward without moving their feet were assessed. The higher values in relation to the dynamic balance are interpreted as the better balance ability.

In order to measure the proprioception index, the researcher used Zebris (posturomed, Haider bioswing, German), which are postural analyzers. Subjects located their feet in the middle of the circle, and their abilities to recover the balance as fast as they could while they were rocking, by releasing the switch, were assessed. Totally 3 kinds of data are measured: x-value, y-value and rotation-value. X-value is the degree of shaken to the leftward and rightward, y-value is the degree of shaken backward and forward, and rotation-value is the degree of turned left and right. The lower values mean that the subjects returned to their position faster and are interpreted as the better proprioception sense. All the measurements were conducted before and after the intervention.

RESULTS

Twenty eight subjects participated in the study were consisted of 12 male and 16 female students. There was no significant difference between groups in general characteristics(Table 1).

Table 1. General characteristics of subjects

	Group A	Group B
Gender(m/f)	5/9	7/7
Age(years)	22.5±1.64	23.1±1.34
Height(cm)	167.1±7.28	169.5±4.21
Weight(kg)	64.6±11.57	65.4±8.09

Comparison between ankle taping and knee taping in the static balance

There was no significant increase of static balance abilities in both groups of ankle taping and knee taping (Table 2).

Table 2 Comparison between ankle taping and knee taping in the static balance

Static Balance		Mean±SD	
		Before	After
Ankel	Trace Length (mm)	352.08±85.31	325.42±86.14
	C90 area (mm^2)	324.65±201.41	235.71±119.42
	C90 angle (degree)	−19.14±53.33	−8.43±67.44
	STD Velocity (mm/s)	6.25±1.77	5.52±1.44
	Velocity (mm/s)	11.41±2.90	10.92±2.81
Knee	Trace Length (mm)	372.47±93.92	320.34±61.22
	C90 area (mm^2)	342.48±296.35	244.12±122.57
	C90 angle (degree)	−4.25±62.19	−2.11±56.77
	STD Velocity (mm/s)	7.12±2.33	5.47±1.12
	Velocity (mm/s)	12.89±4.46	10.71±2.11

*p<0.05, mean±SD, STD velocity: standard deviation value for the velocity of COP

Comparison between ankle taping and knee taping in the dynamic balance

In the ankle taping group, significant increase of dynamic balance abilities appeared in the forward, leftward and rightward. In the knee taping group, there was significant increase of dynamic balance abilities in the forward and leftward (Table 3).

Table 3 Comparison between ankle taping and knee taping in the dynamic balance

Dynamic balance (degree)		Mean±SD	
		Before	After
Ankel	Forward	2.17±0.84	2.89±0.91*
	Reward	7.34±0.54	7.43±0.74
	Leftward	5.19±0.81	5.49±0.61*
	Rightward	5.71±0.65	6.28±0.88*
Knee	Forward	2.25±0.80	2.75±0.87*
	Reward	7.18±0.84	7.41±0.55
	Leftward	5.25±0.74	5.76±0.64*
	Rightward	5.91±0.75	6.32±0.79

*p<0.05, mean±SD

Comparison between ankle taping and knee taping in the proprioception sense

In both groups of ankle taping and knee taping, there was significant increase of pos.x values (Table 4).

Table 4 Comparison between ankle taping and knee taping in the proprioception sense

Proprioception		Before	After
Ankel	pos.x	274.49±71.24	219.17±37.45*
	pos.y	1.64±0.76	1.42±0.66
	rotation	2.82±3.37	1.93±1.21
Knee	pos.x	291.52±62.83	240.15±40.26*
	pos.y	1.69±1.01	1.59±0.84
	rotation	1.75±0.92	2.11±1.01

*p<0.05, mean±SD

DISCUSSION

This study assessed the effects of the ankle and knee taping on balance abilities. The findings showed that ankle taping was effective in the forward leaning and left-rightward leaning of dynamic balance. The knee taping showed to be effective in the forward leaning and left ward leaning of dynamic balance. Proprioception sense showed to be increased in both groups.

The results showing that administering ankle taping were more effective than knee taping for improving dynamic balance ability may be due to the dynamic balance ability test itself, in which the ankle strategy was used ahead of the knee strategy. Simon and the colleagues administered Kinesio taping to the subjects with instability in the ankle found decrease of instability and increase of force sense [12]. Furthermore, Kang and the colleagues administered taping in the talus and observed increased passive range of motion in the ankle [13], and proved taping administered in the ankle is effective for decrease in instability and increase in range of motion [14]. Lee also reported that the application of the ankle taping helped improve the balance [15].

Improvement of proprioception sense appeared in both groups, and this may be because taping administered in the ankle and the knee increased stability of each joint and induced to neurofascilitation of cutaneous receptor [16]. However, there was no significant change in static balance ability in both groups. A possible explanation for these results could be the application of Kinesio tape only to the applied joint, since other muscles and joints, such as the hip, are also involved in these activities [17]. This may be because administering Kinesio taping play a major role in increasing one joint stability, it was not effective for the balance ability in the general static condition. Thus, application of Kinesio tape in healthy people does not influence static balance.

This study found that administering ankle taping and knee taping was helpful for improving dynamic balance abilities and proprioception sense. But, there was few difference of effects according to area of applied Kinesio tape.

CONCLUSIONS

The results of this study suggest that the application of Kinesio tape to the anke and knee is able to promote immediate changes to balance, proprioception sense in healthy. And, there is not difference effectiveness according to application area.

REFERENCES

1. Kwon YJ, Park SJ, Jefferson J et al. The effect of open and closed kinetic chain exercises on dynamic balance ability of normal healthy adults. J Phys Ther Sci. 2013; 25(6): 671-4.
2. Kim, YE, Bang DH, Shin WS. Effects of Ankle Joint Position during Closed Kinetic Chain Exercise on Strength and Balance in Chronic Stroke. J Kor Phys Ther. 2015; 27(5): 345-50.
3. Kim JH. Effects of EMG-Biofeedback Using Closed Kinetic Chain Exercise on Q-angle and Quadriceps Muscle Activation in Patellofemoral Pain Syndrome. J Kor Phys Ther. 2016; 28(2): 65-70.

4. Bird ML, Hill KD, Fell JW. A randomized controlled study investigating static and dynamic balance in older adults after training with Pilates. Arch Phys Med Rehabil. 2012; 93(1): 43–9.
5. Kaesler DS, Mellifont RB, Kelly PS et al. A novel balance exercise program for postural stability in older adults: a pilot study. J Bodyw Mov Ther. 2007; 11(1): 37–43.
6. Carter ND, Khan KM, Petit MA et al. Results of a 10 week community based strength and balance training programmed to reduce fall risk factors: a randomized controlled trial in 65–75 year old women with osteoporosis. Br J Sports Med. 2001; 35(5): 348–51.
7. Hopper D, Samsson K, Hulenik T et al. The influence of Mulligan ankle taping during balance performance in subjects with unilateral chronic ankle instability. Phys Ther Sport. 2009; 10(4): 125–30.
8. Bennell K, Duncan M, Cowan S. Effect of patellar taping on vasti onset timing, knee kinematics, and kinetics in asymptomatic individuals with a delayed onset of vastus medialis oblique. J Orthop Res. 2006; 24(9): 1854–60.
9. Drowatzky JN, Zuccato FC. Interrelationships between selected measures of static and dynamic balance. J Health Educ. 1967; 38(3): 509–10.
10. Bae YS. Spiral Taping Improves Performance on Star Excursion Balance Test in Individuals with Unilateral Chronic Ankle Instability. J Kor Phys Ther. 2016; 28(6): 376–80.
11. Gehlsen GM, Whaley MH. Falls in the elderly: Part II, Balance, strength, and flexibility. Arch Phys Med Rehabil. 1990; 71(10): 739–41.
12. Aman JE, Elangovan N, Yeh IL et al. The effectiveness of proprioceptive training for improving motor function: a systematic review. Front Hum Neurosci. 2014; 8: 13–5.
13. Simon J, Garcia W, Docherty CL. The effect of kinesio tape on force sense in people with functional ankle instability. Clin J Sport Med 2014; 24(4): 289–94.
14. Kang MH, Kim JW, Kim MH et al. Influence of walking with talus taping on the ankle dorsiflexion passive range of motion. J Phys Ther Sci 2013; 25(8): 1011–3.
15. Lee SY. The Effect of a Taping on Muscle Strength, and Proprioception in Ankle. Journal of the Korean Society of Physical Medicine, 2008; 3(4): 225–33.
16. Lee MS, Lee JH, Park SK et al. The Effect of Ankle Joint Taping Applied to Patients with Hemiplegia on Their Gait Velocity and Joint Angles. J Korean Soc Phys Ther. 2012; 24(2): 157–62.
17. Konishi Y. Tactile stimulation with Kinesiology tape alleviates muscle weakness attributable to attenuation of Ia afferents. J Sci Med Sport. 2013; 16(1): 45–8.
18. Lins CA, Borges DT, Macedo LB et al. Delayed effect of Kinesio Taping on neuromuscular performance, balance, and lower limb function in healthy individuals: a randomized controlled trial. Braz J Phys Ther. 2016; 20(3): 231–9.