J Int Acad Phys Ther Res 2017; 8(2): 1142—1145
ISSN 2092-8475

www.iaptr.org
https://doi.org/10.20540/JIAPTR.2017.8.2.1142

The Effect of Kinematic Taping on Respiratory Muscle Strength in Smokers

The purpose of this study was to examine the effect of kinematic taping on respiratory muscle strength in smokers. Twenty – five university students who smoke were involved in the study. All participants were applied to kinematic taping to breathe deeply again. Subjects sit on their backs straight up and place their hands on their thighs. Tape 1 is applied from the lower prominent neck vertebrae(seven cervical vertebra) inward and downward, past shoulder blade, around ribs to the lower tip of sternum. Tape 2 extends to the lower, outer edge of shoulder blade, around ribs to the lower tip of sternum. Respiratory muscle strength was measured with Micro Mouth Pressure Measurement before and after taping. The application of kinematic taping significantly improved the inspiratory and expiratory muscle strength ($p<.05$). These findings suggest that kinematic taping effective in improving respiratory muscle strength and deep breathing.

Key words: *Kinematic taping; Deep Breathing; Respiratory Muscle Strength*

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Received : 28 February 2017
Revised : 25 March 2017
Accepted : 07 April 2017

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INTRODUCTION

Kinematic taping combines the advantages of taping using an elastic tape with the assessment and treatment principles of international manual therapy [1]. Kinematics, from the Greek word kinema(movement), describes the movement of points and bodies in space [1].

According to the study of the comparison of the physical strength level according to the smoking status, it can be seen that whether smoking is an important factor in determining the physical ability [2]. This is because carbon monoxide and nicotine introduced into the human body by smoking stimulates the chemical receptors, thereby increasing the heart rate and blood pressure, decreasing the blood flow and decreasing the respiration efficiency [3].

The muscular components of the respiratory system consist of the primary breathing muscle, the diaphragm, and the accessory muscle of ventilation [4]. Inspiration is an active movement involving the contraction of the diaphragm and intercostal muscles [5]. The accessory muscles include the sternocleidomastoids, scalenes, serratus anterior, pectoralis major and minor, trapezius, and erector spinae [5]. The degree to which these accessory muscles are used by the patient is dependent on the severity of cardiopulmonary distress [5]. The diaphragm, which is responsible for about 60% of the inspiration of respiration, increases the pressure of the abdominal cavity by using the advantage of the rim shape, and this contraction of the diaphragm increases the volume of the lung by pulling it toward the front and back side of the lung [6]. During forced inspiration, and additional number of accessory muscles may contract along with the muscles involved in quiet inspiration [6]. The erector spinae contact to extend the vertebral column [3]. This extension permits greater elevation of the ribs during inspiration. Various back muscle (eg. erector spinae, trapezius,

rhomboids) contact to stabilize the vertebral column., head and neck [5].

There are several methods of intervention to improve weakened lung function such as drug, surgery, and exercise. Walking, running, and bicycle are examples of exercise methods [7]. The taping method can be applied to the skin by attaching an untreated adhesive tape to the skin to prevent relief pain, improve mobility, reduce the swelling, and prevent injuries or signs of overuse [1]. The effect of kinesiology taping on muscular strength depends on the application technique. Taping from the insertion of muscle to its origin inhibits muscle function [8], whereas taping from the muscle origin to insertion facilitates the muscle function [9, 10]. The underlying mechanism of the taping is thought to be cutaneous stimulation of the sensorimotor and proprioceptive systems [11, 12].

There have been various studies on the kinesiology taping method, and there have been various studies on the effect of the kinesiology taping method on the breathing [12-18]. However, there is a lack of research on the kinematic taping method. Therefore, this study examined the effects of kinematic taping on respiratory muscle strength in smokers.

METHODS

Subjects

The subjects of this study are 25 university students in smokers. The general features of the subjects are shown in Table 1. This study conducted after receiving consent forms from the subjects.

Table 1. Characteristics of subjects

General characteristic	Mean±SD
Sex(M/F)	25/0
Age(yr)	21.85±.05
Height(cm)	176.4±5.56
Weight(kg)	74.28±9.25

Methods

Application method of kinematic taping

Subjects sit upright on a stool by placing both hands on the tops of thighs so that elbow. Tape 1 is applied from the lower prominent neck vertebrae (seven cervical vertebra) inward and downward, past shoulder blade, around ribs to the lower tip of sternum. Tape 2 extends to the lower, outer edge of shoulder blade, around ribs to the lower tip of sternum.

Measurement

The maximum inspiratory pressure (MIP) and the maximum expiratory pressure (MEP) were measured using a Micro Respiratory Pressure Meter (Micro RPM, CareFusion / MICRO Medical Limited, UK). Before the measurement, subjects were instructed about the test method and fully informed. The maximum inspiratory pressure (MIP) was measured and the maximum expiratory pressure (MEP) was measured after a comfortable rest of about 5 minutes. The mean value was used after three measurements. Respiratory muscle strength was measured before taping and with taping.

Data analysis

All data were analyzed using the statistical program SPSS 18.0. Frequency analyses were conducted with study subjects' general characteristics and the means and standard deviations of the characteristics were calculated. Wilcoxon matched pairs tests were conducted to examine changes between before and with taping the study. To test statistical significance, the significance level was set to α=.05.

RESULTS

Comparison of MEP and MIP according to taping application

The results of the non-taping and with taping appear as follows in 〈Table 2〉. Maximum expiratory pressure were 94.625 ±13.444 in the non-taping and 100.041±10.217 in the with taping. Maximum expiratory pressure significantly increased according to taping application ($p<.05$). Maximum inspiratory pressure were 72.125± 12.632 in the non-taping and 77.375±12.017 in the with taping. Maximum inspiratory pressure significantly increased according to taping application($p<.05$).

Table 2. Comparison of MEP and MIP according to taping application

unit : cmH_2O

	Non-taping	With taping	D-value	Z	p
MEP	94.625±13.444	100.041±10.217	5.416±11.549	-2.048	.041*
MIP	72.125±12.632	77.375±12.017	5.250±8.916	-2.865	.004**

*p<.05, **p<.01, MEP : maximum expiratory pressure, MIP : maximum inspiratory pressure

DISCUSSION

This study was conducted to investigate the effects of kinematic taping on respiratory muscle strength based on previous studies that kinesiology taping is effective in improving respiratory muscle strength. The study examined the effect of kinesiology taping applied to respiratory muscles of smokers on maximum respiratory muscle strength ($p<.05$). As a result of applying kinematic taping, MIP and MEP were significantly increased. The results indicate that kinesiology taping applied to respiratory muscles improved on maximum respiratory muscle strength of the inspiratory and expiratory muscle.

These results are in close agreement with those of numerous authers. Hong(2010) found that as a result of a study on the effects of taping application on muscle strength of the inspiratory muscles on respiratory muscle, MIP(cmH_2O) increased from 72.125 to 77.375, which was statistically meaningful and MEP(cmH_2O) increased by from 94.625 to 100.041, which was not statistically meaningful in comparison with those before elastic tape was applied [11]. Lee et al.(2014) Reported that respiratory muscle strength was significantly improved when 20 healthy adults were given inspiratory muscle training and taping simultaneously [12]. Jang et al.(2010) reported that respiratory function improved after application of kinesio tape to the respiratory muscle of patients with pulmonary dysfunction. The positive enhancement in body flexibility and maximum muscle strengths were shown before and after applicatiojn of kinesiotaping [13].

These findings are in contrast to the results of Sari et al. Previous studies applied taping to respiratory muscles in 47 healthy university students [14]. The results indicate that kinesiology taping applied to respiratory muscles has no effect on maximum respiratory muscle strength [14]. Wang applied joint mobilization and stretching in very severe COPD with thoracic kyphosis [15]. The result indicate that joint mobilization and stretching applied to respiratory function has no effect [15]. Tieh-Cheng Fu et al. found that kinesiology taping did not affect the muscular strength of healthy individuals [16].

Kinematic taping is considered to be effective in improving respiratory muscle strength because it supports the diaphragm and accessory muscles muscles of respiration and increases the movement of the thorax. This study is different from the previous study using kinesiology taping that kinematic taping was applied to investigate changes in respiratory muscle strength. In this study, it is meaningful that kinematic taping of John and Karin is applied unlike previous research. The limitation of this research is that this study only involved 25 university students, which makes it difficult to apply the results more broadly.

CONCLUSIONS

The purpose of this study is to examine the effect of kinematic taping on respiratory muscle strength in smokers. The total number of participants were 25 university students in smokers. All participants were applied to kinematic taping to breathe deeply again. As a result of applying kinematic taping, MIP and MEP were significantly increased. The results indicate that kinesiology taping applied to respiratory muscles improved on maximum respiratory muscle strength of the inspiratory and expiratory muscle.

This study results showed that kinesiology taping had little effect on improving respiratory muscle strength of smokers. In the future, it is necessary to increase the number of subjects or to study smokers of various ages.

REFERENCES

1. John Langendoen, Karin Sertel. Kinesiology Taping The Essential Step-by-Step Guide, 1st Ed. Robert ROSE, Canada. 2011: 22-3.
2. Boyce RW, Perko MA, Jones GR, et al. Physical fitness, absenteeism and workers' compensation in smoking and non-smoking police officers. Occupational Medicine, 2006; 56(5): 353-6.
3. Tippetts DS, Winden DR, Swensen AC, et al. Cigarette smoke increases cardiomyocyte ceramide accumulation and inhibits mitochondrial respiration. Cardiovascular Disorders, 2014; 14(1), 165.
4. Cameron MH, Monroe LG. Physical Rehabilitaion : Evidence-Based Examination, Evaluation, and Intervention. Philadelphia: SAUNDERS. 2007; 690.
5. Donna Frownfelter, Elizabeth Dean. Cardiovascular and Pulmonary Physical Therapy, 4 Ed. MOSBY, USA. 2006: 54-60.
6. Khedr EM, Shinawy OE, Khedr T, et al. Assessment of corticodiaphragmatic pathway and pulmonary function in acute ischemic stroke patients. Eur J Neurol, 2000; 7(5): 509-16.
7. Yang SH. The effects of respiratory muscle strengthening exercise in smokers to the respiratory function. Korea Entertainment Industry Association, 2016; 10(6): 361-7.
8. García-Muro F, Rodríguez-Fernández AL, Herrero-de-Lucas A: Treatment of myofascial pain in the shoulder with Kinesio taping. A case report. Man Ther, 2010; 15: 292 - 5.
9. Yasukawa A, Patel P, Sisung C. investigating the effects of Kinesio Taping in an acute pediatric rehabilitation setting. Am J Occup Ther, 2006, 60: 104 - 10.
10. Liu YH, Chen SM, Lin CY, et al.: Motion Tracking on Elbow Tissue from Ultrasonic Image Sequence for Patients with Lateral Epiconylitis. 29th Annual International Conference of the IEEE EMBS Citė Internationale, Lyon, France, August 2007: 23 - 6.
11. Fu TC, Wong AM, Pei YC, et al.: Effect of Kinesio taping on muscle strength in athletes-a pilot study. J Sci Med Sport, 2008; 11: 198 - 201.
12. Slupik A, Dwornik M, Bia ł oszewski D, et al.: Effect of Kinesio Taping on bioelectrical activity of vastus medialis muscle. Preliminary report, 2007; 9: 644 - 51.
13. Hong JG. The Effects of the Application of an Elastic Tape to Inspiratory Muscles on Pulmonary Function and Respiratory Muscle Strength. Korea University. 2010.
14. Lee MS, Kim MC, Ahn CJ : Impact of Concurrent Inspiratory Muscle Training and Tape on Inspiratory Muscle Strength, Endurance and Pulmonary Function. Journal of The Korean Society of Integrative Medicine, 2014; 2(3): 65~73.
15. Jang BC, Kim GH. The Effects of Kinesiotaping on the Flexibility and Maximum Muscle Strength. Journal of Special Physical Education, Yongin University 2010; 7: 21-38.
16. Sari Z, Kablan N, Camcioglu B, Aydogdu O, Kavlak B, Yurdalan SU, Polat MG. The Effect of Kinesiology Taping on Respiratory Musscle Strength. 2012; 24: 241-4.
17. Wang J Phys Ther Sci. Effect of joint mobilization and stretching on respiratory function and spinal movement in very severe COPD with thoracic kyphosis. J Phys Ther Sci, 2015; 27: 3329-31.
18. Fu Tc, Wong AM, Pei YC, et al.: Effect of Kinesio taping on muscle strength in athletes-a pilot study. J Sci Med Sport, 2008; 11: 198 - 201.