RESEARCH ARTICLE

Engin Tastaban

Aydin Adnan Menderes University, Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Aydin, Türkiye

Corresponding Author:
Engin Tastaban
mail: engintastaban@gmail.com

Received: 10.08.2022
Acceptance: 03.10.2022
DOI: 10.18521/ktd.1160513

Short-Term Effect of Kinesio Taping on Neck Pain and Disability in Patients with Loss of Cervical Lordosis: A Randomized Controlled Study

ABSTRACT

Objective: The patients with loss of cervical lordosis have weakened neck extensors. This study aimed to investigate the effect of Kinesio taping, applied to the cervical extensors, on neck pain and disability in patients with loss of cervical lordosis.

Methods: A total of 111 patients with neck pain due to loss of cervical lordosis completed the study (54 Kinesio tape group, 57 control group). All patients were given paracetamol 1500 mg/day for four days. Additionally, the Kinesio tape group received one session of Kinesio taping treatment. Neck pain intensity was assessed using the Visual Analogue Scale, and neck disability was evaluated using the Neck Disability Index. The measurement points were baseline and day 4.

Results: Visual Analogue Scale and Neck Disability Index scores were similar at baseline. Statistically significant improvements in the levels of pain and disability were observed in both groups; however, there was further change in the Kinesio tape group ($p<0.001$).

Conclusions: Kinesio taping is effective in achieving improvement of significant pain and neck disability symptoms related to loss of cervical lordosis.

Keywords: Kinesio Taping, Cervical Lordosis, Pain, Disability.

Servikal Lordoz Kaybı Olan Hastalarda Kinesio Bantlamanın Boyun Ağrısı ve Sakatlık Üzerindeki Kısa Dönemli Etkisi: Randomize Kontrollü Bir Çalışma

ÖZET

Amaç: Servikal lordoz kaybı olan hastaların boyun ekstansör kaslarında zayıflama olmaktadır. Bu çalışmanın amacı, servikal lordoz kaybı olan hastalarda servikal ekstansör kaslarına uygulanan Kinesio bantlamanın hastaların boyun ağrısı ve sakatlık üzerine etkisini araştırmaktır.

Gereç ve Yöntem: Servikal lordozda kaybı olan toplam 111 hasta çalışmayı tamamladı (54 hasta Kinesio bant grubu, 57 hasta kontrol grubu). Tüm hastalara dört gün boyunca 1500 mg/gün parasetamol tablet verildi. Ek olarak, Kinesio bant grubuna bir seans Kinesio bantlama tedavisi uygulandı. Hastaların boyun ağrısı şiddeti Görsel Analog Skala, boyun sakatlığı şiddeti ise Boyun Özür İndeksi kullanılarak değerlendirildi. Hastaların değerlendirmeleri tedavinin başlangıç günü ve 4. gün yapıldı.

Bulgular: Tedavi öncesi hastaların Görsel Analog Skala ve Boyun Özür İndeksi skorları benzerdi. Tedavi sonrası her iki grupta boyun ağrısı ve sakatlık düzeyi skorlarında istatistiksel olarak anlamlı iyileşmeler gözlendi. Bununla birlikte Kinesio bant grubundaki iyileşmenin daha anlamlı olduğu gözlendi ($p<0.001$).

Sonuç: Kinezyo bantlama, servikal lordoz kaybıyla ilişkili boyun ağrısı ve boyun sakatlığı iyileştirilmesinde etkili bir tedavidir.

Anahtar Kelimeler: Kinezyo Bantlama, Servikal Lordoz, Ağrı, Sakatlık.

Konuralp Medical Journal
e-ISSN1309–3878
konuralptipdergi@duzce.edu.tr
konuralptipdergisi@gmail.com
www.konuralptipdergi.duzce.edu.tr

INTRODUCTION

Loss of cervical lordosis or straight cervical spine is a common finding visible on lateral cervical x-ray, and this condition is a cause of structural overload and degeneration of muscles, tendons, and discs in the cervical region (1). It is not entirely understood why cervical lordosis decreases, but atrophic (2) or weakened (3) neck extensors and laminoplasty (4) are proposed contributors. Besides clinical symptoms like neck pain (5) and dizziness (6), loss of cervical lordosis is associated with reduced vertebral artery hemodynamics (7). On the other hand, some individuals with loss of cervical lordosis are asymptomatic, too (8). Various treatment methods, including spinal manipulation (9), cervical extension traction (6), and neck extensor exercises (10), have been explicitly used to restore cervical lordosis and improve clinical symptoms in patients with loss of cervical lordosis. However, there is currently no standardized treatment approach for the condition.

Kinesio taping is a therapeutic and rehabilitative clinical method applied to patients. It was developed by a Japanese chiropractor, Dr. Kenzo Kase, in the 1970s to help relieve pain and restore injured soft tissues. Today, this method has become increasingly popular, and many clinicians use it to improve a variety of musculoskeletal and other disorders such as injury, pain, dysfunction, and lymphedema (11-13). It has been suggested that Kinesio taping has multiple mechanisms of action, including changes in muscular activity and tension supporting muscles, reduction of nociceptive stimuli causing pain relief, proprioceptive facilitation and segmental stabilization, and activation of lymphatic drainage (11-15).

To the best of our knowledge, no previous study has investigated the role of Kinesio taping specifically in patients with loss of cervical lordosis. However, patients with loss of cervical lordosis have atrophic (2) and weakened neck extensors (3), and the mechanism of action of Kinesio taping also includes muscle support (11-13). Accordingly, Kinesio taping applied to support the neck extensors may be useful in patients with loss of cervical lordosis. Therefore, this study aimed to investigate the effect of Kinesio taping on neck pain and disability, specifically in patients with loss of cervical lordosis.

MATERIAL AND METHODS

This study was designed as a short-term, prospective, non-blinded, randomized controlled trial with two measurement points (baseline and day 4). By the principles of the Declaration of Helsinki, the study was carried out at the University Faculty of Medicine Department of Physical Medicine and Rehabilitation between April 2017 and August 2017. Approval from the Ethics committee and institutional permissions were obtained for the implementation of the research (Decision No: 2017-5/13; Institution permission date: April 12, 2017), and written informed consent was obtained from each participant.

All patients with loss of cervical lordosis with acute neck pain (pain duration ≤3 months) were evaluated by the same physiatrist for eligibility. Loss of cervical lordosis was determined on the standard lateral cervical x-ray by using the posterior tangent technique measuring the total cervical curvature, which refers to the angle between lines drawn parallel to the posterior surface of the C2 and C7 vertebrae. We considered the ″loss of cervical lordosis″ for this angle as +4º to –4º (16).

Patients aged <18 or >40 years or who have the following medical conditions were excluded: chronic neck pain (pain duration >3 months), normal cervical lordosis (lordosis angle<-4º), cervical kyphosis (lordosis angle>+4º), cervical vertebral anomalies, inflammatory rheumatic diseases, neck injury or surgery, cervical herniated disc or radiculopathy, obesity, and psychiatric illness. The patients were randomly assigned into two groups using sequentially numbered cards by helpful staff. The evaluation tools were a 10-cm visual analog scale (VAS) and the Turkish version of the Neck Disability Index (NDI), which are used for the evaluation of neck pain and disability (17). The NDI, a scale made up of 10 items, is a self-assessment inventory designed to evaluate self-perceived pain and disability. The higher the score, the greater the perceived pain and disability. The ten items include neck pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping, and leisure activities (17).

All patients were given paracetamol 1500 mg/day for four days. Additionally, the Kinesio tape group received one session of Kinesio taping treatment for four days, while the control group received no additional therapy. Two Y-shaped tapes, one on each side of the cervical spine and the trapezius muscles, were applied horizontally. The remaining Y-shaped tape was attached vertically to the cervical spine (Figure 1).

Figure 1. Application of Kinesio taping

Statistical Analysis: IBM SPSS Statistics 16 (SPSS Inc., Chicago, IL, USA) program was used for statistical analysis. The Kolmogorov-Smirnov normality test was used to determine whether the continuous data were normally distributed. In the intergroup comparisons of continuous variables, the Student's t-test was used for normally distributed variables, while the Mann-Whitney U test was used for variables with non-normal distribution. The paired t or Wilcoxon tests were performed for the intragroup comparisons of continuous variables considering the normality test results. Categorical variables were evaluated by the Chi-square test and were presented as numbers (percentage). Continuous data were presented as mean (SD) (min.-max.). $p<0.05$ was considered statistically significant.

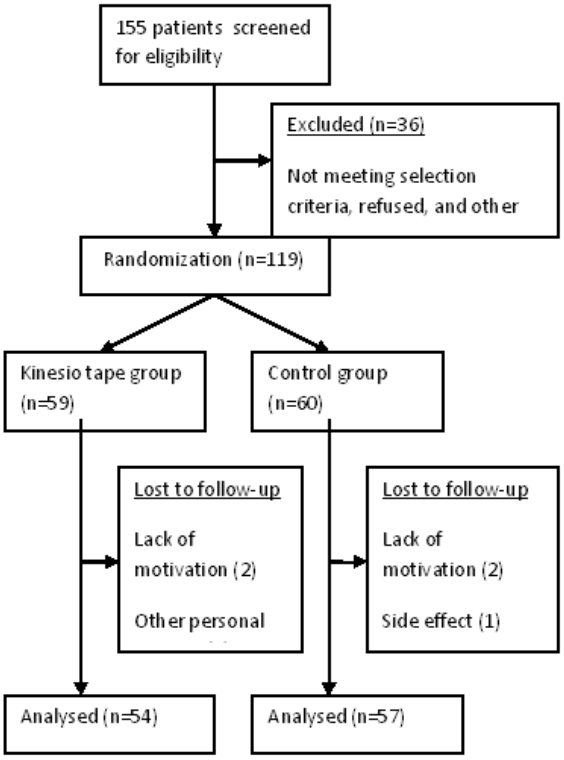

Figure 2. The Flow of Study Participants

RESULTS

Figure 2 presents the flow diagram demonstrating the study progression. A total of 155 neck pain patients with loss of cervical lordosis were screened for eligibility. Out of the 119 patients who met the selection criteria and were randomized to the treatment groups, 111 completed the study (54 Kinesio tape group, 57 control group) (Figure 2).

In both groups, most patients were female, approximately 65-67%. In addition, the two groups were similar in terms of patient baseline characteristics, including age, sex, body mass index, cervical lordosis angle, and neck pain and disability scores ($p>0.05$) (Tables 1 and 2).

Table 1. The Characteristics of Participants

	Kinesio tape (n=54)	Control group (n=57)	p
Age, years	26.87 (7.37)	25.91 (5.81)	0.447
Gender, F/M	35/19	38/19	0.837
BMI, kg/m^2	25.94 (2.06)	26.53 (1.93)	0.127
Angle (°)	0.13 (2.76)	0.35 (2.88)	0.682

BMI: Body mass index, **Angle (°):** Cervical lordosis angle according to the posterior tangent technique, Values are given as mean (SD) or number.

In both groups, in all evaluation parameters (neck pain severity during rest and motion and neck disability scores), significant improvements were found on the fourth day compared with baseline ($p<0.001$). When considering the difference between the two groups in the amount of change from baseline to day 4, the Kinesio tape group was more effective than the control group for improving pain and disability ($p<0.001$) (Table 2).

Table 2. Neck Pain Severity and Neck Disability

	Kinesio Tape Group (n=54)	Control Group (n=57)	p1
VAS (rest)			
Baseline	7.37 (0.90) (4-9.5)	7.16 (0.99) (4.5-8.2)	0.625
Fourth day	2.32 (1.59) (0-8.5)	4.93 (1.28) (0-8)	
Difference	5.05 (1.68)	2.22 (1.42)	<0.001
p2	<0.001	<0.001	
VAS (motion)			
Baseline	7.70 (0.84) (4-9.6)	7.51 (0.91) (4.5-8.9)	0.329
Fourth day	2.49 (1.72) (0-9)	5.25 (1.47) (0-10)	
Difference	5.21 (1.65)	2.25 (1.53)	<0.001
p2	<0.001	<0.001	
NDI			
Baseline	15.76 (6.15) (3-24)	15.18 (5.93)	0.612
Fourth day	7.09 (3.66) (0-20)	10.89 (6.28)	
Difference	8.67 (5.98)	4.28 (5.80)	<0.001
p2	<0.001	<0.001	

NDI: Neck Disability Index, VAS: Visual analog scale, p1: Intergroup comparison; p2: Intragroup comparison in each group between baseline and fourth day. Values are given as mean (SD) when using the parametric test and given as mean (SD) (min.-max.) when using the non-parametric test.

DISCUSSION

In our study, our results suggest that combined Kinesio taping and paracetamol have a more substantial positive effect on neck pain and disability than paracetamol alone in managing the loss of cervical lordosis. Previous studies of the Kinesio taping effect in patients with neck pain

have revealed conflicting results (18-22). Ozkan et al. also suggested that Kinesio taping significantly improves the VAS, NDI scores, cervical range of motion, and cervical lordosis angles. They claimed that the combination of therapeutic exercise and Kinesiotaping is beneficial in reducing pain and disability and improving range of motion and cervical lordosis loss in patients with chronic non-specific neck pain (18). González-Iglesias et al. reported that Kinesio taping improved neck pain and cervical range of motion in patients with acute whiplash injury (19). Similarly, Ay et al. shown that Kinesio taping improved neck pain and mobility in patients with cervical myofascial pain syndrome (20). On the other hand, Saavedra-Hernández et al. reported that cervical thrust manipulation and Kinesio taping have similar effects on neck pain and disability in patients with mechanical neck pain (21). Similarly, Puerma-Castillo et al. obtained no evidence of additional benefits from using Kinesio taping in addition to conventional treatment in patients with neck pain (22). However, the present study and the studies mentioned above differ somewhat in their specific topics. In addition, thanks to its focus on the loss of cervical lordosis, the present study is different and original.

Although its mechanism of action is not yet clear, Kinesio taping may have a combination of inhibition and activation functions, including reduced nociceptive stimuli and pain inhibition, decreased muscle fatigue and soreness, increased muscle activation, proprioceptive facilitation, enhanced healing of injured tissues, correction of fascial dysfunction and po¬sition, increased segmental stability, activation of blood flow and lymphatic drainage (11-15). Given that one of the effects of Kinesio taping is muscle support (11-13) and loss of cervical lordosis is associated with weakness of the neck extensors (2,3), there are reasonable grounds for using the Kinesio taping applied to support the neck extensors in patients with loss of cervical lordosis. In addition, it has been found that cervical stabilization is provided predominantly by the neck musculature (80%) (23), and proprioceptive and contractive balance of muscles contributes to maintaining spinal stability (24,25). For these reasons, and considering the loss of cervical lordosis is related to cervical muscle imbalance, including extensor muscle weakness (2,3), the positive effect of Kinesio taping on neck pain and disability in patients with the condition may be via proprioceptive facilitation and muscle activation leading to increased cervical muscle balance. Since altered cervical spine alignment is a cause of abnormal vertebral kinematics potentially leading to altered sensorimotor integration through an altered afferent input from the cervical spine soft tissues (6), the corrective effect of Kinesio taping on this abnormal information from sensory afferents in the straight cervical spine may have played an important role in improved neck pain and disability.

On the other hand, the present study has some potential limitations. Because we did not include sham taping in the study, the placebo effect of the application cannot be ruled out. Besides this, due to some selection criteria used in the study design, such as age (>18-<40 years), lordosis angle (+4º to –4º), and pain duration (acute, ≤3 months), the study results cannot be generalized to all patients with loss of cervical lordosis. Nevertheless, the used selection criteria provide sufficient clarity and certainty on the interpretation of study homogeneity.

CONCLUSION

In conclusion, Kinesio taping as an addition to paracetamol provides significant additional benefits on neck pain and disability in patients with loss of cervical lordosis. Considering that the Kinesio taping can be recommended as a complementary treatment option for more successful management of loss of cervical lordosis.

REFERENCES

1. Ferrara LA. The biomechanics of cervical spondylosis. Adv Orthop. 2012;2012:493605.
2. Yoon SY, Moon HI, Lee SC, Eun NL, Kim YW. Association between cervical lordotic curvature and cervical muscle cross-sectional area in patients with loss of cervical lordosis. Clin Anat. 2018;31(5):710-5.
3. Alpayci M, Şenköy E, Delen V, Şah V, Yazmalar L, Erden M, et al. Decreased neck muscle strength in patients with the loss of cervical lordosis. Clin Biomech (Bristol, Avon). 2016;33:98-102.
4. Kurokawa R, Kim P. Cervical Laminoplasty: The History and the Future. Neurol Med Chir (Tokyo). 2015;55(7):529-39.
5. McAviney J, Schulz D, Bock R, Harrison DE, Holland B. Determining the relationship between cervical lordosis and neck complaints. J Manipulative Physiol Ther. 2005;28(3):187-93.
6. Moustafa IM, Diab AA, Harrison DE. The effect of normalizing the sagittal cervical configuration on dizziness, neck pain, and cervicocephalic kinesthetic sensibility: a 1-year randomized controlled study. Eur J Phys Rehabil Med. 2017;53(1):57-71.
7. Bulut MD, Alpayci M, Şenköy E, Bora A, Yazmalar L, Yavuz A, et al. Decreased Vertebral Artery Hemodynamics in Patients with Loss of Cervical Lordosis. Med Sci Monit. 2016;22:495-500.
8. Kumagai G, Ono A, Numasawa T, Wada K, Inoue R, Iwasaki H, et al. Association between roentgenographic findings of the cervical spine and neck symptoms in a Japanese community population. J Orthop Sci. 2014;19(3):390-7.

9. Shilton M, Branney J, de Vries BP, Breen AC. Does cervical lordosis change after spinal manipulation for non-specific neck pain? A prospective cohort study. Chiropr Man Therapy. 2015;23:33.
10. Alpayci M, İlter S. Isometric exercise for the cervical extensors can help restore physiological lordosis and reduce neck pain: a randomized controlled trial. Am J Phys Med Rehabil. 2017;96(9):621-6.
11. Mostafavifar M, Wertz J, Borchers J. A systematic review of the effectiveness of Kinesio taping for musculoskeletal injury. Phys Sportsmed. 2012;40(4):33-40.
12. Williams S, Whatman C, Hume PA, Sheerin K. Kinesio taping in treatment and prevention of sports injuries: A meta-analysis of the evidence for its effectiveness. Sports Med. 2012;42(2):153-64.
13. Basset KT, Lingman SA, Ellis RF. The use and treatment efficacy kinaesthetic taping for musculoskeletal conditions: a systematic review. NZ Journal of Physiotherapy. 2010;38(2):56-62.
14. Kachanathu SJ, Alenazi AM, Seif HE, Hafez AR, Alroumim MA. Comparison between Kinesio taping and a traditional physical therapy program in the treatment of nonspecific low back pain. J Phys Ther Sci. 2014;26(8):1185-8.
15. Kasawara KT, Mapa JMR, Ferreira V, Added MAN, Shiwa SR, Carvas N Jr, et al. Effects of Kinesio Taping on breast cancer-related lymphedema: A meta-analysis in clinical trials. Physiother Theory Pract. 2018;34(5):337-45.
16. Grob D, Frauenfelder H, Mannion AF. The association between cervical spine curvature and neck pain. Eur Spine J. 2007;16(5):669-78.
17. Kesiktas N, Ozcan E, Vernon H. Clinimetric properties of the Turkish translation of a modified neck disability index. BMC Musculoskelet Disord. 2012; 13:25.
18. Ozkan FU, Soylu Boy FN, Erdem Kilic S, Geler Kulcu D, Bicer Ozdemir G, Cagliyan Hartevioglu H, et al. Clinical and radiological outcomes of kinesiotaping in patients with chronic neck pain: A double-blinded, randomized, placebo-controlled study. Turk J Phys Med Rehabil. 2020;66(4):459-67.
19. González-Iglesias J, Fernández-de-Las-Peñas C, Cleland JA, Huijbregts P, Del Rosario Gutiérrez-Vega M. Short-term effects of cervical kinesio taping on pain and cervical range of motion in patients with acute whiplash injury: a randomized clinical trial. J Orthop Sports Phys Ther. 2009;39(7):515-21.
20. Ay S, Konak HE, Evcik D, Kibar S. The effectiveness of Kinesio Taping on pain and disability in the cervical myofascial pain syndrome. Rev Bras Reumatol Engl Ed. 2017;57(2):93-9.
21. Saavedra-Hernández M, Castro-Sánchez AM, Arroyo-Morales M, Cleland JA, Lara-Palomo IC, Fernández-de-Las-Peñas C. Short-term effects of kinesio taping versus cervical thrust manipulation in patients with mechanical neck pain: a randomized clinical trial. J Orthop Sports Phys Ther. 2012;42(8):724-30.
22. Puerma-Castillo MC, García-Ríos MC, Pérez-Gómez ME, Aguilar-Ferrándiz ME, Peralta-Ramírez MI. Effectiveness of Kinesio taping in addition to conventional rehabilitation treatment on pain, cervical range of motion and quality of life in patients with neck pain: A randomized controlled trial. J Back Musculoskelet Rehabil. 2018;31(3):453-64.
23. Panjabi MM, Cholewicki J, Nibu K, Grauer J, Babat LB, Dvorak J. Critical load of the human cervical spine: an in vitro experimental study. Clin Biomech (Bristol, Avon). 1998;13(1):11-7.
24. Beinert K, Keller M, Taube W. Neck muscle vibration can improve sensorimotor function in patients with neck pain. Spine J. 2015;15(3):514-21.
25. Cheng CH, Lin KH, Wang JL. Co-contraction of cervical muscles during sagittal and coronal neck motions at different movement speeds. Eur J Appl Physiol. 2008;103(6):647-54.