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Original article

# The effectiveness of Kinesio Taping on pain and disability in cervical myofascial pain syndrome

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ABSTRACT

*Objective:* The aim of this study was to investigate the effectiveness of Kinesio Taping and sham Kinesio Taping on pain, pressure pain threshold, cervical range of motion, and disability in cervical myofascial pain syndrome patients (MPS).
*Methods:* This study was designed as a randomized, double-blind placebo controlled study. Sixty-one patients with MPS were randomly assigned into two groups. Group 1 ($n = 31$) was treated with Kinesio Taping and group 2 ($n = 30$) was treated sham taping five times by intervals of 3 days for 15 days. Additionally, all patients were given neck exercise program. Patients were evaluated according to pain, pressure pain threshold, cervical range of motion and disability. Pain was assessed by using Visual Analog Scale, pressure pain threshold was measured by using an algometer, and active cervical range of motion was measured by using goniometry. Disability was assessed with the neck pain disability index disability. Measurements were taken before and after the treatment.
*Results:* At the end of the therapy, there were statistically significant improvements on pain, pressure pain threshold, cervical range of motion, and disability ($p < 0.05$) in both groups. Also there was a statistical difference between the groups regarding pain, pressure pain threshold, cervical flexion-extension ($p < 0.05$); except cervical rotation, cervical lateral flexion and disability ($p > 0.05$).
*Conclusion:* This study shows that Kinesio Taping leads to improvements on pain, pressure pain threshold and cervical range of motion, but not disability in short time. Therefore, Kinesio Taping can be used as an alternative therapy method in the treatment of patients with MPS.



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## Efetividade do *kinesio taping* na dor e incapacidade na síndrome dolorosa miofascial cervical

*Palavras-chave:*
Síndrome dolorosa miofascial
*Kinesio taping*
Incapacidade
Dor

RESUMO

*Objetivo:* Investigar a eficácia do *kinesio taping* e do *taping* placebo sobre a dor, limiar de dor à pressão, amplitude de movimento cervical e incapacidade em pacientes com síndrome dolorosa miofascial (SDM) cervical.

*Métodos:* Ensaio clínico randomizado duplo-cego controlado por placebo. Foram alocados em dois grupos, aleatoriamente, 61 pacientes com SDM. O grupo 1 (n = 31) foi tratado com *kinesio taping* e o grupo 2 (n = 30) foi tratado com *taping* placebo cinco vezes em intervalos de três dias, durante 15 dias. Além disso, todos os pacientes foram submetidos a um programa de exercícios para o pescoço. Os pacientes foram avaliados em relação à dor, ao limiar de dor à pressão, à amplitude de movimento cervical e à incapacidade. A dor foi avaliada com a escala visual analógica, o limiar de dor à pressão foi medido com um algômetro e a amplitude de movimento cervical ativa foi mensurada com a goniometria. A incapacidade foi avaliada com o Neck Pain Disability Scale. As mensurações foram feitas antes e depois do tratamento.

*Resultados:* No fim do tratamento, houve melhoria estatisticamente significativa na dor, no limiar de dor à pressão, na amplitude de movimento cervical e na incapacidade ($p < 0,05$) em ambos os grupos. Também houve uma diferença estatisticamente significativa entre os grupos em relação à dor, ao limiar de dor à pressão e à flexão-extensão cervical ($p < 0,05$); não houve diferença na rotação cervical, flexão lateral cervical e incapacidade ($p > 0,05$).

*Conclusão:* O *kinesio taping* leva à melhoria na dor, no limiar de dor à pressão e na amplitude de movimento cervical, mas não na incapacidade em um curto período. Portanto, o *kinesio taping* pode ser usado como um método de terapia opcional para o tratamento de pacientes com SDM.



## Introduction

Myofascial pain syndrome (MPS) is one of the most common musculoskeletal problems and is an important cause of morbidity in adults. MPS is a condition characterized by chronic pain and associated with trigger points in one or more muscles, taut bands, characteristic referred pain, and local twitch response. Patients refer to hospitals with local or referred pain, muscle weakness, tightness, limited mobility, weakness, tenderness, autonomic dysfunctions and local twitch response in the affected muscle.[1,2]

The exact etiology of MPS is not fully understood; therefore, the treatment is focused on decreasing pain, improving muscle strength and providing good posture. Patients' education and training programs, nonsteroidal anti-inflammatory drugs (NSAID), local injections, physical therapy, acupuncture and exercise programs are the most common treatment methods.[1]

Kinesio Taping (KT) has been increasingly used in musculoskeletal conditions and sports injuries. This technique was developed in Japan by Kase and recently it became very popular in pain treatment.[3,4] Kinesio Tape is a thin, light, and elastic material which does not restrict the joint movement.[4,5] It is found to be effective in decreasing pain and muscular spasm, increasing the range of motion (ROM), improving local blood and lymph circulations, reducing edema, strengthen weakened muscles, control joint instability and postural alignment.[6–8] Although the exact mechanisms of KT is not understood, sensorimotor, proprioceptive feedback mechanisms, inhibitory and excitatory nociceptive stimuli, mechanical restraint were explained as underlying mechanisms.[4,6,7] In this double-blinded, randomized placebo controlled study, we aimed to compare the efficacy of KT and placebo KT methods on pain, pressure pain threshold, ROM and disability in patients with MPS.

## Materials and methods

Seventy-three patients (50 female, 23 male) with cervical MPS involving the upper neck and levator scapula muscle referred to our outpatient clinic were included in the study. The diagnosis of MPS was based on the criteria described by Travell and Simons (5 major and minimum 1 minor criteria are required for clinical diagnosis).[9] The patients' inclusion criteria were presence of at least one active trigger point located in levator scapula muscle, ages greater than 18 years, and symptom duration of at least 3 months. The exclusion criteria were diagnosis of fibromyalgia syndrome, cervical disc lesion, radiculopathy, myelopathy, recent trigger point injection or participating in a physical treatment program within the last 6 months, neurologic and inflammatory diseases, pregnancy or history of neck and shoulder surgery.

After physical examination, full blood count, erythrocyte sedimentation rate, C-reactive protein, and biochemical markers were evaluated.

This study was prospective, randomized, placebo-controlled double-blind trial. Before treatment, all participants were informed about the study and signed written informed consent. The study was approved by the University of Ufuk Human Research Ethics Committee.

### *Randomization*

Patients were randomly assigned into two groups by numbered envelopes method. The group 1 and group 2 notes were put into to the closed envelopes separately, and each patient randomly chose an envelope and gave it to the physiotherapist. Both patients and two examining physicians were blinded to treatment allocation. Only the physiotherapist who applied the therapy was aware of the procedure and physiotherapist record the patient names and their groups.

Group 1 patients ($n = 31$) were treated with Kinesio Tape (Kinesio Tex Gold, 2 in × 103.3 ft) suggested by Kase et al. five times by intervals of 3 days for 15 days. Taping was performed by a physiotherapist who is certified for this method. The muscle inhibition technique which was described by Kase was used. We applied the taping to levator scapula muscle. The shoulder was depressed and neck was in lateral flexion and rotation position to the opposite side. A 15–20 cm long "I" strip was used. Application started from the superior scapular angle. Initial portion of the tape was stretched maximum 4–5 cm and then it was sticked on the muscle origo which was at the level of 1–4 thoracic transverse process without stretching[5] (Fig. 1).

Group 2 patients ($n = 30$) were treated with sham taping five times by intervals of 3 days for 15 days. Sham taping was applied with an "I" strip of the same material on ineffective parts of the muscle without a tension with the neck in neutral position (Fig. 2).

Additionally, all patients received a home-based exercise program including isometric-isotonic neck exercises and back extensor stretching exercises everyday for two weeks.

**Fig. 1 – Kinesio Taping technique.**

**Fig. 2 – Sham Kinesio Taping technique.**

No analgesic drugs or NSAIDs were allowed during the treatment process.

### *Clinical outcomes*

Patients were evaluated according to pain, pressure pain threshold, cervical ROM and disability.

*Pain*
Pain was assessed by using a visual analog scale (VAS, 0–10 cm; 0 means no pain, 10 means severe pain).

*Pressure pain threshold*
Pressure pain threshold (PPT) on the trigger point was measured with an algometer (Algometer Commander, JTECH Medical, Utah). The measurement was taken three times and the mean average value was recorded.

*Cervical joint range of motion*
The active ROM of cervical joint (flexion, extension, right–left flexion and rotation) was measured using a goniometer when the patient was in sitting position.

*Disability*
Disability was measured by using the Neck Pain Disability Scale (NPDS). Turkish version of this scale was found valid and reliable. The questionnaire consists of 20 items and measures neck movements, pain intensity, effect of neck pain on emotion factors, and interference with daily life activities. Each section is scored on a 0–5 rating scale and total score ranges from 0 to 100.[10]

### *Statistical analysis*

The means and standard deviations were given as descriptive statistics. All data for normality were tested by using the Kolmogorov–Smirnov test. Per-protocol analysis was used for the comparison of treatment groups. For determining the difference before and after treatment for all groups, non-parametric Wilcoxon test was used. To compare the

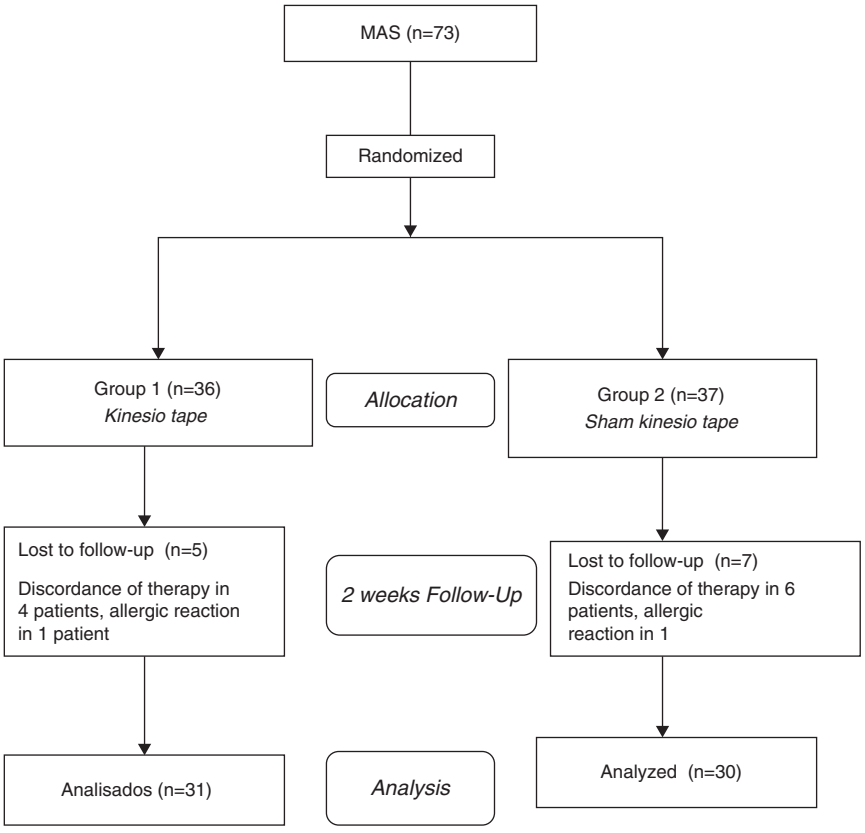


**Fig. 3 – Flow diagram showing of patients through the clinical study.**

differences between two groups, the Mann–Whitney *U* test was used. A level of significance of $p < 0.05$ was accepted. All analyses were performed using the SPSS for Windows 18.0 software program.

## Results

Thirty-six patients in group 1 (27 females and 9 males) and 37 patients in group 2 (30 females and 7 males) with MPS were included the study. After randomization, 4 patients in Group 1 and 6 patients in Group 2 dropped out because they could not attend the follow-up program regularly in the study. Then, one patient from Group 1 and one patient Group 2 dropped out because allergic reaction occurred. Sixty-one patients completed the study and no side effects had been observed (Fig. 3).

Table 1 shows the demographic and clinical properties of the Group1 and Group 2. No statistically significant differences were detected between the groups at baseline values ($p > 0.05$) except NPDS ($p < 0.05$).

The results of full blood count, erythrocyte sedimentation rate, C-reactive protein and biochemical markers were within normal ranges for both groups.

After two weeks follow up, there were statistically significant improvements in both groups regarding VAS, PPT, ROM and NPDS ($p < 0.05$) (Table 2).

**Table 1 – Demographic and clinic characteristics of the patients.**

| | Group 1 ($n = 31$) | Group 2 ($n = 30$) | $p$ |
|---|---|---|---|
| Age (years) | 44.80 ± 17.19 | 44.10 ± 17.45 | 0.76 |
| Gender (female/male) | 22/9 | 23/7 | 0.61 |
| Duration of pain (month) | 14.48 ± 4.99 | 13.50 ± 2.76 | 0.97 |
| VAS | 5.00 ± 2.00 | 4.56 ± 2.17 | 0.38 |
| PPT (N) | 61.29 ± 8.92 | 61.73 ± 5.35 | 0.61 |
| NPDS | 49.77 ± 21.37 | 39.80 ± 12.51 | 0.05[a] |

VAS, visual analog scale; PPT (N), pressure pain threshold, Newton; NPDS, Neck Pain Disability Scale.
[a] $p < 0.05$.

After the treatment, statistical significant differences were observed in VAS, PPT, cervical flexion-extension values ($p < 0.05$) between the groups. However no differences were found in cervical rotation, lateral flexion and NPDS ($p > 0.05$) (Table 2).

## Discussion

Myofascial pain syndrome is the most commonly occurring musculoskeletal disorders seen by physiatrists. There is no accepted standard treatment program for MPS. The main issue

**Table 2 – Comparison of the assessment parameters in both groups and between the groups.**

| | Group 1 ($n=31$) (mean ± SD) | Group 2 ($n=30$) (mean ± SD) | $p$ |
|---|---|---|---|
| *Variable (independent) VAS* | | | |
| Baseline | 5.00 ± 2.00 | 4.56 ± 2.17 | |
| Posttreatment | 2.35 ± 1.99 | 3.93 ± 1.96 | 0.004[b] |
| $p$ | 0.000[a] | 0.000[a] | |
| *PPT* | | | |
| Baseline | 61.29 ± 8.92 | 61.73 ± 5.35 | |
| Posttreatment | 78.09 ± 7.18 | 71.43 ± 10.25 | 0.003[b] |
| $p$ | 0.000[a] | 0.000[a] | |
| *Cervical flexion* | | | |
| Baseline | 64.58 ± 7.66 | 59.86 ± 7.01 | |
| Posttreatment | 71.90 ± 7.54 | 64.86 ± 6.79 | 0.001[a] |
| $p$ | 0.000[a] | 0.001[a] | |
| *Cervical extension* | | | |
| Baseline | 51.93 ± 12.83 | 44.83 ± 12.42 | |
| Posttreatment | 55.96 ± 13.63 | 47.20 ± 14.21 | 0.015 |
| $p$ | 0.007[b] | 0.003[b] | |
| *Right lateral flexion* | | | |
| Baseline | 39.64 ± 13.77 | 33.83 ± 5.52 | |
| Posttreatment | 42.61 ± 14.78 | 35.93 ± 5.80 | 0.357 |
| $p$ | 0.001[a] | 0.003[b] | |
| *Left lateral flexion* | | | |
| Baseline | 40.93 ± 14.4 | 33.83 ± 5.52 | |
| Posttreatment | 43.90 ± 14.94 | 42.43 ± 17.97 | 0.390 |
| $p$ | 0.000[a] | 0.001[a] | |
| *Right rotation* | | | |
| Baseline | 60.58 ± 11.58 | 61.36 ± 12.31 | |
| Posttreatment | 64.74 ± 11.04 | 63.60 ± 9.55 | 0.348 |
| $p$ | 0.001[a] | 0.006[b] | |
| *Left rotation* | | | |
| Baseline | 63.09 ± 12.43 | 67.53 ± 8.24 | |
| Posttreatment | 66.83 ± 13.01 | 67.93 ± 7.97 | 0.907 |
| $p$ | 0.001[a] | 0.10 | |
| *NPDS* | | | |
| Baseline | 49.77 ± 21.37 | 39.80 ± 12.51 | |
| Posttreatment | 35.67 ± 20.27 | 36.10 ± 12.16 | 0.558 |
| $p$ | 0.000[a] | 0.000[a] | |

VAS, visual analog scale; PPT, pressure pain threshold; NPDS, Neck Pain Disability Scale; SD, standard deviation.

[a] $p<0.001$.

[b] $p<0.05$.

in the MPS treatment is to provide pain relief on trigger points, improving disability and increasing cervical motion.[1,2] Kinesio Taping is a new alternative technique used in MPS.[3,4] This study was planned as a randomized double-blind placebo controlled study in which efficacy of KT and placebo KT methods on pain, PPT, ROM of cervical joint and disability in MPS treatment. After 2 weeks of treatment, all assessment parameters showed statistically significant improvements in both KT and sham groups. There was a statistical difference between the groups regarding VAS, PPT, cervical flexion-extension, except cervical rotation, cervical lateral flexion and NPDS.

Although there are a lot of studies in the literature about the effect of taping on musculoskeletal system and sport injuries, there are limited number of randomized controlled studies on MPS.[3,11,12] However, there is no planned randomized double-blind placebo controlled study in which efficacy of KT in pain, PPT, ROM of cervical joint and disability in MPS treatment. A case report has suggested that KT may be beneficial for the treatment of a patient with shoulder pain of myofascial origin. They observed significant improvement in the functional tests active shoulder range of motion and there was no change in the VAS.[13] In a randomized double-blind study with MPS included fifty patients, the efficiency of KT was compared with dry needling and significant decrease in pain, PPT and disability was observed. They found that KT was at least as effective as dry needling in the treatment of MPS.[14] Hernandez et al. compared the effectiveness of KT and cervical trust manipulation in mechanical neck pain with 36 patients; they observed KT or cervical trust manipulation leads to similar reduction in

pain severity, disability and increases in ROM.[15] Although Gonzalez et al. found an improvement in pain and ROM in patients with acute whiplash injury with KT, these were small and not clinically meaningful.[8] In our study, KT group showed statistically significant improvements regarding VAS, PPT, ROM and NPDS. Although significant improvements were observed in pain, PPT, cervical flexion-extension, compared to the placebo group, there was no change in cervical rotation, cervical lateral flexion and NPDS.

Multiple theories have been proposed to explain the mechanisms of KT, including enhance proprioception, cutaneus mechanoreceptors, improved blood and lymphatic circulation, reduced pain severity, realignment of joints, assist the postural alignment and relax the overused muscles.[4,7,11] As a result of KT, we observed that pain, PPT, ROM and disability measures showed statistically significant improvements in KT group. Stimulating the gate control mechanism results a decrease in pain through the increase in afferent feedback found in the skin. Another theory suggests that the improved ROM and pain are due to an increased proprioseptive feedback mechanism and muscle facilitation.[4,7,8,11]

In the study Thelen et al., found that KT improved pain-free shoulder range of motion but no effect on pain or function. They also observed KT and cervical spine trust manipulation reduced disability.[16] A lot of published clinical trials have suggested that KT may be beneficial in treating patellofemoral pain syndrome, shoulder impingement syndrome, lower extremity spasticity and postural rehabilitation in Parkinson's Disease.[6,7,17,18] A few systematic reviews have evaluated the effect of KT on musculoskeletal and different clinical conditions. These randomized trials compared KT versus sham taping or other interventions. The results of reviews suggested that KT had no significant benefit or its effect was too small in terms of clinical practice. However these trials were low-moderate quality, small sample sizes and very small follow-up periods.[4,7,8] The most important difference of our study was to have higher number patients and designed as a randomized double-blind placebo controlled study.

Cervical ROM restriction mostly occurs because of muscle spasm in MPS. Studies showed improvement in ROM values after KT.[8,15] In our study, a significant increase was obtained in two weeks in cervical ROM in both groups. Although significant improvements were observed on cervical flexion-extension, compared to the placebo group, but there was no change cervical rotation, cervical lateral flexion. The increase in cervical ROM may be due to the reduction in patients' cervical muscle spasms or exercise programs applied to the patients. In our study, home exercise program was applied to all patients and improvement of cervical ROM was observed in both groups. The limitation of our study was not to have an only exercise group which could be compared to KT and sham KT. Also, we investigated the short-term results of KT.

In conclusion, KT is a noninvasive, painless method that has less side effects, is well tolerated and has been used in MPS. This study shows that KT leads to improvements on pain, PPT, and ROM, but not in disability in short period. Therefore, KT can be used as an alternative therapy in the treatment of patients with MPS. But, more research is necessary for both clinical and long-term effects of the Kinesio Taping technique.

## Conflicts of interest

The authors declare no conflicts of interest.

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