

# Influence of Kinesio tape application on masticatory muscles activity evaluated using surface electromyography – a pilot study

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## Abstract

**Introduction** Kinesio tape (KT) application is a treatment option for patients with musculoskeletal problems. High levels of muscle tenderness in trapezius muscle were correlated with high levels of jaw dysfunction.

**Aim** The aim of the present study was to evaluate the influence of Kinesio tape application on the masticatory muscles activity using surface electromyography.

**Material and methods** Thirty healthy adults (10 men and 20 women; mean age 25±6) were examined. The electrical activity of the temporalis anterior (TA) and masseter muscle (MM) of the right and left side before and after KT application on trapezius muscle was recorded during two conditions: resting mandibular position and isometric clenching. The electromyograph BioEMG III and BioPAK Measurement System were used for the recording.

**Result** The electrical activity of the TA and MM muscles of the right and left side during clenching isometric activity after KT application was significance lower

## Key words:

Taping, Trapezius,  
Electromyography,  
Masticatory muscles

in comparison to isometric activity before KT application (mean difference: TAR  $-6.417\mu\text{V}$ , TAL  $-9.313\mu\text{V}$ , MMR  $-20.827\mu\text{V}$ , MML  $-12.953\mu\text{V}$ ;  $p < 0.05$ ).

**Conclusions** Application of Kinesio tape on trapezius muscle reduces masticatory muscle activity during clenching.

## Introduction

The trapezius muscle is the most common muscle presenting myofascial pain syndrome (MPS) symptoms. [1] High levels of muscle tenderness in the upper trapezius were correlated with high levels of jaw dysfunction. [2] The cervical spine and jaw muscles activity is noticed as a factor correlate with the temporomandibular disorder (TMD). [3] Patients with TMD tended to develop tenderness in trapezius, masseter, temporalis and sternocleidomastoid muscles. [4,5] Moreover, symptoms from the cervical spine may be referred to the stomatognathic region through the trigeminocervical nucleus. [2] Greenspan et al. showed that patients with TMD were more sensitive to a wide range of mechanical and thermal pain tests in the orofacial area and trapezius muscle than control subjects. [6] Da Costa et al. studies reported about the clinical interconnection between masticatory and cervical structures. [7] A study by Alonso-Blanco et al. showed that the referred pain elicited from active trigger points (TrPs) in neck-shoulder musculature reproduced the pain pattern in the orofacial region in women with myofascial TMD. [8]

Kinesio tape (KT) application, first introduced by Kenzo Kase, is a treatment option to mechanically support the movement. [9] This technique uses an elastic tape, which can be stretched to 140% of its original length and applied to the skin. [10] KT application has clinically important beneficial effects on muscles strength, the range of motion, however, the effects of KT on proprioception and muscle activation are largely unknown. [11,12] However, there are few studies that support the positive effect of KT for neck and upper extremity muscles. [13] Öztürk G et al. showed that application of KT to the trapezius muscle resulted in an improvement in the pain level after KT application. [14] Moreover, KT application on the trapezius reduces the subjective pain

sensation. [15] A study by Ptaszkowski et al. showed that after KT application on trapezius muscle, the average resting bioelectrical activity of this muscle decreased by  $0.8\mu\text{V}$ . [16]

## Aim

The aim of the present study was to evaluate the influence of Kinesio tape application on the masticatory muscle activities using surface electromyography.

## Materials and methods

### Ethics statement

This study was approved by the ethical committee of Medical University of Lublin, Poland (KE-0254/331/2015). All participants were informed about the procedures they would undergo and gave their informed consent to participate in the tests.

### Subjects description

The participants were 30 healthy adults (10 men and 20 women; mean age  $25.4 \pm 6.1$ ). Participants were healthy individuals and had no masticatory muscles and trapezius pain in last 6 months. They had no known neurological disorders, sensory deficits, no signs or symptoms of TMD based on an RDC/TMD examination.

### Measurement plan

The 8-channel electromyograph BioEMG III, compatible with BioPAK Measurement System, was used for the recording. The surface electrodes (Ag/AgCl) were distributed to the muscle fibre direction of TA and MM muscles as shown in Figure 1. The reference electrode was placed on the processus spinosus of C7 as shown in Figure 2. The measurement was

compiled from SENIAM standards. The skin under the electrodes was cleaned with alcohol.

Prior to KT application, the electrical activity of the TA and MM muscles of the right and left side was recorded in two conditions: during resting mandibular position and clenching. For each participant, muscles rest position measurement (5 seconds), and the maximal – as hard as possible clench measurements (three times for 3 seconds each, with 2 seconds of rest between) were recorded.

The trapezius muscle, the most common muscle presenting with myofascial pain syndrome (MPS) symptoms, was chosen for observing the effect of KT application in the present study. [1] The Kinesio® Tex Gold with a width of 5 cm was used in this study. Prior to application, the subject was asked to flex their neck laterally to the contralateral side with rotation their head to the same side. The KT was applied inferior to the acromion, and the initial part of the band was stretched maximally before KT was applied through the upper side of the trapezius to the hairline, as shown in Figure 2 (according to the Kenzo Kase method). [14] After KT application, the electrical activity of the TA and MM muscles during resting mandibular position and clenching was recorded.

### Statistical analysis

IBM SPSS STATISTICS program was used to prepare the statistical analysis. To compare the variables between the conditions (with and without KT application), T-test paired-samples were used. Differences

were regarded as statistically significant if the level of probability value was lower than the statistical significance 0.05.

## Results

The difference between electrical activity of the TA and MM muscles of the right and left side during rest mandible position before and after KT application did not achieve significance application (mean difference: TAR  $-0.089 \mu\text{V}$ , TAL  $-0.018 \mu\text{V}$ , MMR  $-0.085 \mu\text{V}$ , MML  $-0.091 \mu\text{V}$ ), but did not achieve statistical significance ( $p > 0.05$ ). [Table 1]

As presented in Table 2, the electrical activity of the TA and MM muscles of the right and left side during clenching isometric activity after KT application was significance lower in comparison to isometric activity before KT application (mean difference: TAR  $-6.417 \mu\text{V}$ , TAL  $-9.313 \mu\text{V}$ , MMR  $-20.827 \mu\text{V}$ , MML  $-12.953 \mu\text{V}$ ;  $p < 0.05$ ). [Table 2]

## Discussion

Öztürk et al. reported that application of KT to the trapezius muscle resulted in an improvement in the pain level after KT application at a month after the use of KT. [14] These findings suggest, that KT application is an effective treatment for reducing the signs and symptoms of masticatory muscle pain in patients. The aim of the present study was to evaluate

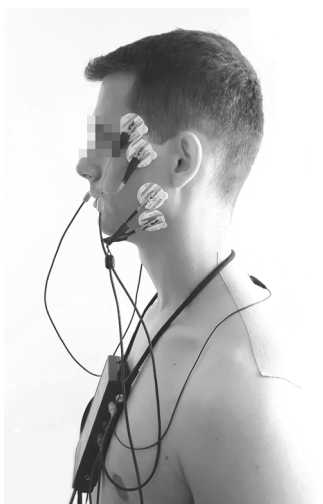


Fig. 1.



Fig. 2.

**Table 1.**

Surface electrical activity (sEMG) of the temporalis anterior (TA) and masseter (MM) muscles of the right and left side during resting mandibular position before and after Kinesio tape (KT) application

Muscle	Measurement	n	Mean sEMG activity ( $\mu\text{V}$ )	SD	Mean difference ( $\mu\text{V}$ )	t	p
TA Right	without KT	30	2.097	0.880	0.089	0.682	0.501
	with KT	30	2.007	0.965			
TA Left	without KT	30	1.942	0.705	0.018	0.166	0.869
	with KT	30	1.924	0.898			
MM Right	without KT	30	1.357	0.442	0.085	1.819	0.079
	with KT	30	1.273	0.401			
MM Left	without KT	30	1.321	0.490	0.091	1.886	0.069
	with KT	30	1.231	0.527			

**Table 2.**

Surface electrical activity (sEMG) of the temporalis anterior (TA) and masseter (MM) muscles of the right and left side during clenching before and after Kinesio tape (KT) application.

\* statistical significance  $p < 0.05$

Muscle	Measurement	n	Mean sEMG activity ( $\mu\text{V}$ )	SD	Mean difference ( $\mu\text{V}$ )	t	p
TA Right	without KT	30	86.140	35.674	6.417	3.731	0.001*
	with KT	30	79.723	34.141			
TA Left	without KT	30	93.733	36.547	9.313	4.917	0.001*
	with KT	30	84.420	33.614			
MM Right	without KT	30	121.176	56.327	20.827	4.157	0.001*
	with KT	30	100.350	47.784			
MM Left	without KT	30	103.863	54.499	12.953	3.397	0.002*
	with KT	30	90.910	47.397			

the influence of Kinesio tape application on the masticatory muscle activities using surface electromyography. This is the first study which evaluated the relationship between trapezius muscle KT application and the masticatory muscles activity. Our results showed, that the electrical activity of the TA and MM muscles during clenching after trapezius KT application was significance lower in comparison to activity during clenching before KT application. The difference between the electrical activity of the TA and MM muscles during resting mandibular position

after KT application was also lower in comparison to isometric activity before KT application but did not achieve significance. Borin et al. study suggest, that decrease in pain and in the electrical activity of temporal muscles, indicating a possible association between the factors pain and electrical activity increase. [17] Decrease in the electrical potential during clenching in the left and right TA and MM muscles after trapezius KT application may be associated with the decrease in pain in patients with TMD and MPS symptoms. The efficacy of trapezius muscle KT

application on masticatory muscle activity in patients with TMD and MPS symptoms and the influence of KT application on long-term effects of treatment requires further research.

## Conclusions

1. Application of Kinesio tape on trapezius muscle reduces masticatory muscle activity in clenching isometric activity.
2. The influence of Kinesio tape application on long-term effects requires further research.

## Acknowledgments

The results of the present study do not constitute endorsement of the product by the authors or the journal.

## Conflict of interest

The authors declare that they have no conflict of interest.

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