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Original Research Article

The effect of Kinesio Taping on maximal grip force and key pinch force

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ABSTRACT

Introduction: Kinesio Taping method is used to achieve various therapeutic effects such as circulation improvement, subcutaneous lymphatic drainage, muscle facilitation or inhibition, fascia correction, and mechanical correction. According to its founder, the effects of KinesioTex tape on the body will differ depending on how and where such tape is placed. **Aim:** To evaluate whether Kinesio Taping can increase maximal grip force and maximal key pinch force for healthy non-athletic subjects after 30 min and 1 h following the application.

Materials and methods: In total, 54 healthy subjects participated in this study. Both hands were used in the research. Special Kinesio Taping technique was applied to 32 hands (Kinesio Taping group), and placebo taping to 22 hands (placebo group); no taping technique was applied to 54 hands (control group). A dynamometer was employed for grip force, and a manometer for key pinch force measurements. The chosen level of significance was $p < 0.05$. The power of the study was calculated. In the case of $\beta \leq 0.2$, the difference was statistically significant.

Results and discussion: In the Kinesio Taping group no changes in maximal key pinch force after 30 min were observed; however, 1 h following the application maximal key pinch force increased ($p < 0.05$, $\beta = 0.3$); maximal grip force increased both after 30 min ($p < 0.05$, $\beta = 0.2$) and 1 h following the application ($p < 0.05$, $\beta < 0.2$). No changes in the measured forces were observed in the placebo and control groups ($p > 0.05$).

Conclusions: The Kinesio Taping technique did not result in changes to maximal key pinch force after 30 min, but increased maximal key pinch force after 1 h and maximal grip force after 30 min and 1 h following such application.

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1. Introduction

Kinesio Taping method as a new taping technique was developed by Japanese Dr. Kenso Kase in 1973. This method differs from other taping techniques because of the specially designed elastic tape – KinesioTex Gold – which is used and applied directly on the skin in a special manner in order to achieve

various therapeutic effects, such as circulation improvement, subcutaneous lymphatic drainage, muscle facilitation or inhibition, fascia correction, and mechanical correction. According to its founder, the effects of KinesioTex tape on the body will differ depending on how and where such tape is placed.

Dr. Kenso Kase suggests two basic application directions for the treatment of muscles. For acutely over-used or stretched

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muscles, the tape is applied from muscle insertion to origin to inhibit muscle function. For chronically weak muscles or where an increased contraction is desired, the tape is applied from origin to insertion to facilitate muscle function. A proper tape application for muscle facilitation occurs when light (“paper off”) to moderate tension is used, i.e., 25–50% of the available tension. Another type of Kinesio Taping application (where maximal tape tension is used) is called functional correction. This type is used to increase sensory stimulation to either assist or limit motion.⁶

Evidence concerning the effects of Kinesio Taping on muscle strength has been limited thus far. Some studies have shown a significantly increased recruitment of motor units and an increased bioelectrical activity following application,^{2,4,8} however, Fu et al. in their pilot study found no significant difference in quadriceps isokinetic muscle strength either immediately following the tape application or after 12 h of taping.³ Hsiao-Yun Chang et al. tried to determine the immediate effects on maximal grip strength and force sense in healthy collegiate athletes after the application of Kinesio Taping to the forearm. They also concluded that Kinesio Taping did not result in changes to maximal grip strength.¹ However, it should be mentioned that during their research Hsiao-Yun Chang et al. applied KinesioTex tape from insertion to origin with a 15–20% stretch tension and it was taped along the medial edge of the forearm to wrap the common wrist flexor muscles. This particular technique, according to Dr. Kenso Kase, is supposed to inhibit muscle function.⁶

2. Aim

The aim of our study was to evaluate whether Kinesio Taping can increase maximal grip force and maximal key pinch force for healthy non-athletic subjects after 30 min and 1 h following the application of KinesioTex Gold tape using the technique, which, according to its founder, is designed to facilitate the muscles as well as add functional correction stimulating finger flexion.

3. Materials and methods

In total, 54 healthy non-athlete volunteers (34 women, 20 men) participated in the research. Prior to the research, all subjects were interviewed and inspected as regards the following exclusion criteria: hand trauma, former surgery, impaired hand function, present pain or other kinds of complaints in the hand area, very hairy or very fragile skin. Only if none of these conditions was found, subjects were involved in the research. The study was approved by the appropriate ethics committee related to the institution (Rehabilitation Department, Medical Academy, Lithuanian University of Health Sciences, Kaunas, Lithuania) in which it was performed. All included volunteers were informed about the sequence of the research procedure and understood its details, and signed an informed consent prior to participation.

Both hands of subjects were used for the research. For 32 hands (Kinesio Taping group) special Kinesio Taping technique, supposed to facilitate main muscles responsible

for maximal grip and key pinch and increase grip and key pinch forces, was applied; for 22 hands (placebo group) placebo taping was applied using nonelastic medical tape; and for 54 hands (control group) no taping technique was applied. Subjects who were included in the placebo group knew nothing about the Kinesio Taping method.

According to biomechanical principles, main muscles, which interact in order to make a fist and are responsible for maximal grip force, are not only finger flexors, but also wrist extensors. The latter stabilize the wrist by blocking wrist flexion tendency caused by activated flexors muscles. During a strong grip, wrist extensors hold the wrist at about 35° of extension and nearly 5° of ulnar deviation, thus optimizing the length-tension relationship of the extrinsic finger flexors, thereby facilitating maximal grip strength. Key pinch is another important function of the hand. Key pinch is the ability to pinch an object between the thumb and the lateral side of the index finger. Several muscles interact to produce key pinch force, most notably – the first dorsal interosseus and the adductor pollicis.⁷ These biomechanical principles determined our choice for the selection of the muscles to be taped in the facilitating technique in order to try to increase maximal grip and key pinch forces. A dynamometer was used for maximal grip force measurement, and a manometer for maximal key pinch force measurement.

First all subjects, in standardized position, were asked to press a dynamometer and a manometer with maximal strength, and to repeat this thrice with a 1 min rest break between measurements. The mean of these three measurements was deemed as the initial (start-up) maximal grip or key pinch force.

3.1. Kinesio Taping group

After the first measurement of maximal grip and key pinch forces for 32 subjects, one hand of each subject was taped using KinesioTex Gold tape, which was placed directly on the skin in the muscle facilitating technique following the school of Dr. Kenso Kase. The taped muscles included the following: flexor digitorum superficialis, flexor digitorum profundus, extensors of the wrist, adductor pollicis, flexor pollicis brevis, and first interosseus dorsalis. KinesioTex Gold tape was placed on the skin from origin of these muscles to insertion using a 15–25% tension of the tape (“paper off” tension) (Figs. 1–3). Additionally, the functional correction technique was applied in order to stimulate finger flexion (the tape was placed on fully actively extended fingers from the metacarpophalangeal joint towards finger tips; 100% tension of the tape was used; and no tension at both ends of tape) (Fig. 4). For the final view of the arm following the Kinesio Taping application, see Figs. 5 and 6.

Maximal grip and key pinch force measurements were repeated in the same standardized manner after 30 min and 1 h following the Kinesio Taping application, with the tape remaining in situ.

3.2. Placebo Taping group

For 22 subjects, who knew nothing about the Kinesio Taping method, after the first measurement of maximal grip and key pinch forces, one hand of each subject was taped employing the same technique as in the Kinesio Taping group, but with nonelastic 5 cm wide medical tape (Mefix) (Figs. 7 and 8).

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