



PROSPECTIVE, RANDOMISED, BLINDED CLINICAL TRIAL

Kinesiologic taping and muscular activity: A myofascial hypothesis and a randomised, blinded trial on healthy individuals^{☆,☆☆}



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Summary *Background:* During recent years scientific research has demonstrated a growing interest in elastic and anaesthetics adhesive taping techniques. However, only a few studies investigating the principles behind the effects of taping. At present, the action mechanisms of kinesiology taping remain speculative.

Objectives: To investigate the effects of taping application on the tone of the pectoralis major muscle at rest, in absence of any relevant pathologies.

Methods and measures: The study involved a prospective, randomised and blinded clinical trial on healthy individuals and a repeated measures study design. Two different taping techniques (facilitatory and inhibitory) were applied over the pectoralis major of 24 healthy volunteers. The outcome measure was passive range of motion of external rotation of the glenohumeral joint.

Results: Facilitatory taping significantly enhanced the activity of the underlying muscle. Results showed a negative correlation between facilitatory taping application and the contralateral pectoralis major length, indicating a possible effect on the muscle tone of areas outside the site of direct application. The inhibitory taping application did not produce significant results.

[☆] This study was designed and carried out as a final research project at the Bachelor of Science degree in Physiotherapy at the University of Padua, Italy.

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Conclusions: effects on ipsilateral and contralateral muscle physiology could be interpreted through the initial hypothesis of taping inducing changes in fascial stiffness. These could be transmitted along the continuing system. Further studies are needed to inform the possible uses of taping in clinical practice.

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Introduction

During recent years scientific research has demonstrated a growing interest in new elastic and anelastic adhesive taping techniques. Although numerous clinical trials on taping techniques can be found in the literature, only a few studies investigate which physiologic changes stand behind the effects of taping. Therefore, at present, the actions of kinesiology taping mechanisms remain speculative.

Furthermore the existing literature investigates different types of applications, with different research hypotheses and outcome measures, leaving a critical review and comparison very difficult.

The effects of taping on pain have been researched (Thelen et al., 2008; González-Iglesias et al., 2009; Paoloni et al., 2011; Chen et al., 2012). The authors conclude that a positive outcome on pain perception, range of movement and speed of recovery can be achieved by taping.

Some authors investigated the relationship between taping and muscular activity (Macgregor et al., 2005; Christou, 2004; Slupik et al., 2007; Franettovich et al., 2008, 2012; Alexander et al., 2008; McCarthy Persson et al., 2009; Lin et al., 2011; Huang et al., 2011). A common outcome of their research seems to be the potential to influence muscular activity, *either at rest* or during a motor performance. This seems to have either facilitatory or inhibitory consequences depending on the direction of the taping application.

Other studies explored the effects of taping on articular range of movement (ROM) and muscle strength (Yoshida and Kahanov, 2007; Chang et al., 2010; McConnell et al., 2011). This association between taping and muscle strength, power and endurance, seems to be the most difficult to demonstrate.

The purpose of this study was to investigate the effects of a simple taping application on the resting tone of the pectoralis major muscle, in absence of any relevant pathologies. The research hypothesis took into consideration the role of the fascial tissue on transmitting tension forces. The site of application was the upper-lateral pectoral area and the outcome measure was the manual assessment of the external rotation ROM of the glenohumeral joint.

Taping action hypothesis

A direct association between tape and fascia has been assumed to be the main working mechanism. Fascia is considered here as the connective tissue constituting both container and connectors for many organs of the human body. Its layers define an anatomical enclosure that separates and, at the same time, connects different muscle

planes (Findley and Schleip, 2007). A growing interest in fascia's properties is shown by reading the scientific literature from the last decade and, since 2007, has been demonstrated by the success of the International Fascia Research Congresses (Bove, 2012; Hedley, 2012).

From an anatomical point of view it is clear that the fascia is intrinsically linked to the surrounding tissues (Hedley, 2010). That part of the fascial tissue is in direct contact with muscular connective structures (epi-, peri- and endomysium) seems to play an important role on the fine tuning of the neuromuscular spindles and Golgi organs, hence adjusting the muscular contraction at rest (Masi et al., 2010).

Although speculative, the research hypothesis considered the property of taping to emulate a sort of artificial fascia, tensioning the underlying superficial fascia in specific directions. Indirectly the deep muscular fascia would then be affected by force transmission (Schleip, 2003a,b).

This myofascial continuity would be able to transmit the relative tensioning of the superficial fascia by a "facilitatory" taping application (taping applied with tension) to the entire local fascial system, determining a sensitisation of the spindle's tuning and an increase of the muscular tone.

Equally, taping applications able to match tension lines through the fascia (detensioning) could determine a relative inhibitory context for the neuromuscular spindles, allowing a reduction of the resting muscle tone ("inhibitory" taping application).

Following this hypothesis for taping action and considering the widespread distribution of the fascial system and its mechanical continuity, it is possible to suppose that a taping application has clinically significant effects even distant from the site of application.

With particular reference to the pectoral fascia, taken into consideration in this study, Stecco et al. (2009) wrote: "the two pectoralis major muscles necessarily modulate their contraction in order to generate a balanced strength. The specific arrangement of the pectoral fascia, connecting the right and left pectoral muscles and passing over the sternum, could permit this type of synchronization."

Methodology

Study design

The study involved two experimental parts. The first consisted of a randomised blinded trial aimed at defining the effects of different taping applications on the underlying muscle tone and on the tone of the contralateral muscle.

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