Journal of Bodywork & Movement Therapies (2016) xx, 1–9

Available online at www.sciencedirect.com

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journal homepage: www.elsevier.com/jbmt

Pilot Study

The acute effects of integrated myofascial techniques on lumbar paraspinal blood flow compared with kinesio-taping: A pilot study

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Received 5 April 2016; received in revised form 9 July 2016; accepted 24 August 2016

KEYWORDS
Myofascial release;
Myofascial techniques;
Kinesio tape;
Blood flow;
NIRS

Summary *Background:* Myofascial techniques and Kinesio Taping are therapeutic interventions used to treat low back pain. However, limited research has been conducted into the underlying physiological effects of these types of treatments.
Objectives: The purpose of this study was to compare the acute effects of integrated myofascial techniques (IMT) and Kinesio Tape (KT) on blood flow at the lumbar paraspinal musculature.
Methods: Forty-four healthy participants (18 male and 26 female) (age, 26 ± SD 7) volunteered for this study and were randomly assigned to one of three interventions, IMT, KT or a control group (Sham TENS). Paraspinal blood flow was measured at the L3 vertebral level, using Near Infrared Spectroscopy (NIRS), before and after a 30-min treatment. Pain Pressure Threshold (PPT) was also measured before and after treatments.
Results: A one-way ANOVA indicated a significant difference between groups for O_2Hb [$F(2,41) = 41.6$, $P < 0.001$], HHb [$F(2,41) = 14.6$, $P < 0.001$] and tHb [$F(2,41) = 42.2$, $P < 0.001$]. Post hoc tests indicated that IMT was significantly greater, from the KT and the control treatments ($P < 0.001$), for changes in O_2Hb, HHb, and tHb. There were no significant differences for PPT [$F(2,41) = 2.69$, $p = 0.08$], between groups.
Conclusions: This study demonstrated that IMT increases peripheral blood flow at the paraspinal muscles in healthy participants compared to KT and sham TENS. The change in blood

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http://dx.doi.org/10.1016/j.jbmt.2016.08.012

Please cite this article in press as: Shah, Y., et al., The acute effects of integrated myofascial techniques on lumbar paraspinal blood flow compared with kinesio-taping: A pilot study, Journal of Bodywork & Movement Therapies (2016), http://dx.doi.org/10.1016/j.jbmt.2016.08.012

flow had no impact on pain perception in the asymptomatic population group.

Introduction

Lower Back Pain (LBP) is a multifactorial dysfunction with many possible causes and a variety of treatments (Richmond, 2012). It has been estimated that LBP is a condition which affects over 70% of people in the developed world (Chou, 2010). It causes more disability globally than any other musculoskeletal condition (Hoy et al., 2014), and it is one of the most costly conditions in the UK (Maniadakis and Gray, 2000). It is estimated that 90% of LBP will resolve within 3 months but 10% will develop into chronic LBP (Andersson, 1999). Impaired blood flow and greater fatigability of the paraspinal muscles have been identified as possible mechanisms associated with LBP (Mori et al., 2004). Previous studies have suggested that LBP subjects exhibit higher muscular loads, increased intramuscular hypoxia and a limited capacity for the paraspinal muscles to consume oxygen (Sakai et al., 2012; Kovacs et al., 2001). Decreases in blood flow to the lumbar paraspinal region have also been associated with detrimental adaptations to proprioception (Thomas and Segal, 2004) and lumbosacral position sense (Brumagne et al., 2013).

Two interventions that have been proposed to improve blood flow are massage therapy and kinesio taping (KT) (Mori et al., 2004; Hagen et al., 2015). The effects of massage on blood flow are equivocal and may be due to inconsistencies in the research such as small sample sizes, lack of control groups (Weerapong et al., 2005) and measurement limitations that make real time measurements of blood flow in massage problematic (Munk et al., 2012). However, these studies refer to more traditional forms of massage and did not use NIRS technology, which provides a non-invasive, dynamic measurement of blood flow to the muscle tissues (Munk et al., 2012).

Myofascial techniques are a form of manual therapy that involves focal soft tissue work to fascia and connective tissues and is widely employed to reduce pain and improve physiological functions (Ajimsha et al., 2014). Various methods and systems have been proposed including myofascial release (Barnes, 1997), connective tissue massage (Holey, 2000), fascial manipulation© (Picelli et al., 2011) and fascial release (Earls and Myers, 2010). For clinical purposes a variety of fascial techniques can be integrated to manipulate and stretch the myofascial or connective tissue layers to achieve various focussed therapeutic goals (Sherman et al., 2006). These include restoring optimal tissue length, reduce pain, improve tissue circulation and improve function (Ajimsha et al., 2014; Barnes, 1997; Celenay et al., 2016; Myers, 2009). It has been postulated that, following injury or a lack of movement, fascia can form adhesions and abnormal cross-links rendering the fascia less pliable and resistant to movement (Bouffard et al., 2007). It has also been proposed that myofascial techniques can influence the ground substance of the connective tissues and mechanoreceptors within fascia, contributing to changes in local fluid dynamics, reducing excessive muscle tension, capillary constriction, and improve local blood flow (Schleip, 2003). Although these studies were not specifically related to LBP it suggests that myofascial techniques may have a role to play in improving blood flow in LBP patients.

Kinesio taping is a popular intervention choice in the treatment of low back pain (Álvarez-Álvarez et al., 2014). It is proposed that the application of Kinesio taping to a stretched muscle creates convolutions to the skin (Kase and Wallis, 2003). These convolutions are believed to lift the skin and underlying fascia, creating room for increased blood and lymphatic flow (Kase and Wallis, 2003), reducing pressure on subcutaneous nociceptors, and subsequently reducing pain (Parreira et al., 2014). Studies on the effects of KT on blood flow are also limited and show conflicting results (Stedge et al., 2012; Williams et al., 2012), however, the ability to affect muscle endurance and improve fatigue has been identified and may be effective in the management of LBP (Hagen et al., 2015).

Currently, it is not known whether KT or myofascial techniques can improve blood flow, nor have these techniques been compared directly. Therefore, the aim of the present study is to determine whether KT or integrated myofascial techniques (IMT) have the potential to increase blood flow. The acute effects of KT and IMT were determined in a healthy population to determine the efficacy of both treatments compared with a sham treatment.

Methods

Participants

Participants were drawn from the student population at the University of Kent and the local area (Table 1). An a priory

Table 1 Participants characteristics by group (mean ± SD).

Group	N (male/female)	Age (yrs)	Height (cms)	Weight (kg)	BMI
IMT	15 (M = 8,F = 7)	28.3 (7.6)	172 (11.5)	70.6 (10.3)	24.0 (3.7)
KT	15 (m = 6, F = 9)	25.4 (8.8)	170 (7.6)	70.2 (13.3)	24.3 (3.6)
Control	14 (m = 4, F = 10)	23.5 (6.6)	170 (7.6)	67.1 (10.4)	23.9 (3.2)

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