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ORIGINAL RESEARCH

Efficacy of kinesiology tape versus postural correction exercises on neck disability and axioscapular muscles fatigue in mechanical neck dysfunction: A randomized blinded clinical trial



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KEYWORDS

Cervical pain;
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Fatigue

Summary *Background:* Mechanical neck dysfunction (MND), with axioscapular muscles fatigue, is highly prevalent worldwide. While postural correction is commonly used for its treatment, efficacy of kinesiology tape (KT) has received considerable attention.

Objectives: To determine the effectiveness of KT versus correction exercises on neck disability, and axioscapular muscles fatigue in MND patients.

Methods: 46 MND patients were randomly assigned into 1 of 2 groups receiving 4 weeks treatment of either KT or correction exercises. Neck disability and axioscapular muscles fatigue as median frequency of electromyography (EMG-MF) were measured pre and post treatment.

Results: Group-by-time interaction was not significant in the multivariable test. Post hoc tests revealed that KT produced more disability reduction than the postural exercises. However, there was no significant interaction for EMG-MF.

Conclusions: KT has been found to be more effective than postural exercises to reduce neck disability. However, both modalities have similar effects to reduce axioscapular muscles fatigue.

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Introduction

Neck pain is one of the most prevalent disorders worldwide. Its 1-year prevalence ranges between 16.7% and 75.1% (Fejer et al., 2006). Occupational and recreational tasks involving sustained postural loading may be recognized as a common etiological factor for mechanical neck and upper back pain (Eltayeb et al., 2009). The level of muscle's activity associated with the posture may be an important determinant of postural control and magnitude of spinal loading. Low levels of muscle's activity are typically associated with sitting tasks that are needed to be maintained for long time (McClean, 2005; Mork and Westgaard, 2006). Consequently, fatigue is one of the impairments of muscle's function which appears most relevant to the postural neck pain (Szeto et al., 2005).

The decline's rate of the median frequency (MF) of the muscle's firing, using surface electromyography (EMG), can be used to measure the fatigue. The MF is defined as the frequency that divides the power spectrum into two parts with equal areas (da Silva et al., 2015; Szeto et al., 2005; Edmondston et al., 2011). The decrease in spectral indices, due to muscle fatigue has been related to the conduction velocity of the action potential propagation, which may be a result of metabolic product accumulation, such as lactate and extracellular K⁺ (Brody et al., 1991; Hagg, 1992).

The most suitable parameter for measuring EMG spectral shifts to lower frequencies has been suggested to be EMG-MF, because it is highly sensitive to muscle-fatigue-related physiological changes (especially the decrease in the conduction velocity of the action potential) and less sensitive to noise during sustained and dynamic contractions (Moritani et al., 1986; De Luca, 1993). This physiological tool could thus be more interested for the comparison between different modalities used for treatment of MND.

Postural correction exercises involving repeated cervical and scapular retractions are commonly used for management of MND to correct the underlying pathomechanics and to reduce axioscapular muscles' spasm (McClean, 2005). Another modality, which is increasingly and clinically used, is kinesiology tape (KT) (Saavedra-Hernández et al., 2012). It is a thin elastic tape which can be stretched up to 130–140% of its original length, thereby providing constant shear force on the skin. It may be applied over or around muscles to provide functional support.

Elastic tape is made of tightly woven elasticized cotton fibers, highly durable and waterproof. KT was conceived to be therapeutic and according to its creators, it yields the following results: correcting muscle's function by strengthening weak muscles; improving blood and lymph circulation by eliminating tissue's fluid or bleeding beneath the skin through muscle's movement; reducing pain through neurological suppression; correcting misaligned joints by relieving muscle's spasm (Kase et al., 2003). KT has attracted much attention of athletes, physical therapists and researchers (Vered et al., 2016; Hashemirad et al., 2016). Pain relief by KT has been reported in a number of previous studies involving different conditions such as, shoulder impingement syndrome (Kaya et al., 2011), acute

whiplash (González-Iglesias et al., 2009) and chronic low back pain (Paoloni et al., 2011; Castro-Sánchez et al., 2012). The interaction of KT on muscle's function has also been reported (Takasaki et al., 2015).

Numerous treatments are commonly used to treat neck pain. However, few interventions have been demonstrated to be effective and most of them are associated with short-term benefits (Hurwitz et al., 2008). Determining the most appropriate intervention for individuals with MND remains a priority for researchers. So, the purpose of this study was to examine the effects of Kinesiology tape in comparison with postural correction exercises program on neck disability and axioscapular muscles fatigue (Upper trapezius and levator scapula) in patients with MND.

Methods

The study was conducted in accordance with the 1964 Helsinki declaration and its later amendments. It was approved by the Research Ethics Committee of Faculty of Physical Therapy, Cairo University. Participation was voluntary and Informed consent was obtained from each patient before participation in the study. Anonymity and confidentiality were assured, and procedures were performed in compliance with relevant laws and institutional guidelines.

Design of the study

A pre-post treatment test randomized blinded clinical trial.

Participants

Participants were forty six patients with mechanical neck dysfunction (25 females) ranging in age from 20 to 40 years. They were recruited from pre and post graduate students as well as employees of Faculty of Physical Therapy Cairo University who were diagnosed by an orthopedist. Mechanical neck pain was defined as generalized neck or shoulder pain provoked by either of the following; sustained neck postures, neck movement, or palpation of the cervical musculature without any definite cervical pathology. Other inclusive criteria include neck disability index (NDI) score above 15 (a minimum score to reflect the presence of at least mild disability) (Vernon, 2008; Vernon and Mior, 1991) Exclusion criteria were as following: (1) history of cervical surgery or trauma, (2) cervical radiculopathy or myelopathy, (3) current medical or physical treatment for cervical dysfunction and (4) presence with any definite cervical disorder.

Sample size determination

Calculations for Sample-size determination were performed for neck disability as a primary outcome measure using G power 3.1 software program. The calculations were based on 1.02 effect size. (It was determined by measurements of our pilot study that involved 16 patients assigned randomly and equally into groups A received kinesiology taping and B received postural correction exercises). Values

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