CHAPTER 1

Introduction

1.1 Rationale

The lower trapezius muscle, which is one of the axioscapular muscles works together with the upper and middle trapezius and serratus anterior in stabilizing the scapula both in static and during shoulder movement (1). There is evidence that changes in behavior of the lower trapezius contribute to abnormal scapulohumeral rhythm and pain in shoulder (1-4). In addition, it has been suggested that changes in behavior of the lower trapezius can be associated with the initiation or perpetuation of chronic neck pain (5, 6). The association of the lower trapezius and neck pain may be explained by mechanical loading on pain sensitive cervicobrachial structures (7).

Several studies have demonstrated that patients with neck pain have altered activity of the lower trapezius muscle, although such alterations are likely to be dependent on task characteristic and measurement protocol used (5, 6). For example, Wegner et al (5) found decreased EMG activity of the lower trapezius during the typing task in patients with neck pain compared to controls. On the other hand, Zakharova-Luneva et al (6) reported greater EMG activity of the lower trapezius muscle at 20%, 50% and 100% maximum voluntary contraction in patients with chronic neck pain as compared to controls for the abduction and external rotation conditions. In addition, Petersen et al (8) investigating lower trapezius muscle strength in patients with unilateral neck pain demonstrated significantly less lower trapezius muscle strength on the symptomatic side compared to asymptomatic side. However, to date, there have been limited investigations of change in muscle thickness of the lower trapezius muscle in patients with chronic neck pain. The change in muscle thickness may provide objective information about the lower trapezius size, which will be useful for customizing rehabilitation programs.

Ultrasound imaging has been widely used to measure change in muscle thickness (9-12). There is evidence suggesting that ultrasound imaging is reliable and valid for measuring thickness of the lower trapezius muscle (13-15). Recently, Day et al (13) have examined the reliability for measuring scapular muscle thickness and how scapular muscle thickness changes with respect to external load in healthy individuals, using ultrasound imaging. The results showed good inter- and intra- reliability for the lower trapezius muscle (ICC = 0.86-0.99). The results also demonstrated that ultrasound imaging could be used to detect absolute change in thickness from resting to arm lifting (75% and 100% of isometric contraction) conditions but was yet unable to detect difference in lower trapezius muscle thickness between a low and high load placed on shoulder. The authors discussed that ultrasound imaging may not be sensitive enough to detect changes at higher levels of muscle contractility or the lower trapezius muscle may function independently of the demand placed on shoulder. Conversely, O'sullivan et al (16) demonstrated no difference in thickness of the lower trapezius at resting and during contraction at 90° and 120° of shoulder abduction between patients with shoulder pain and healthy controls. It seems that a change in thickness of the lower trapezius muscle may depend on loads, task characteristics as well as pathology. As investigation of thickness of the lower trapezius muscle either at resting or during contraction has not yet been conducted in patients with neck pain, this study was aim to investigate thickness of the lower trapezius at resting and during contraction at 120° of shoulder abduction in patients with neck pain compared to healthy controls. Shoulder in 120° of abduction was chosen as this is a standard position for manual muscle testing as described by Kendall et al (17). All participants in the study were alsoright hand dominant as hand dominance may have an effect on muscle thickness measured (7, 8).

1.2 Aims of the study

1. To compare resting thickness of the lower trapezius at 0° and 120° of shoulder abduction between patients with neck pain and controls
2. To compare thickness of the lower trapezius during contraction at 120° of shoulder abduction between patients with neck pain and controls

1.3 Hypotheses of the study

1. Thickness of the lower trapezius at resting at 0° and 120° of shoulder abduction in patients with neck pain would be less than controls
2. Thickness of the lower trapezius during contraction at 120° of shoulder abduction in patients with neck pain would be less than controls