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PREVENTION & REHABILITATION: RELIABILITY STUDY

Inter-rater and intra-rater reliability of a movement control test in shoulder

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A B S T R A C T

Background: Movement faults are commonly observed in patients with musculoskeletal pain. The Kinetic Medial Rotation Test (KMRT) is a movement control test used to identify movement faults of the scapula and gleno-humeral joints during arm movement. Objective tests such as the KMRT need to be reliable and valid for the results to be applied across different clinical settings and patient populations. The primary objective of the present study was to determine the intra-rater and inter-rater reliability of KMRT in subjects with and without shoulder pain.

Methods: Sixty subjects were included in this study based on specific inclusion and exclusion criteria. Two musculoskeletal physiotherapists with different levels of clinical experience performed the tests. The intra-rater reliability was tested in twenty asymptomatic subjects by a single assessor at two week intervals. An equal number of subjects with and without shoulder pain were tested by both the assessors to determine the inter-rater reliability. Both components of the KMRT, the Gleno- Humeral Anterior Translation (GHAT) and the Scapular Forward Tilt (SCFT) were tested.

Results: The Kappa values for inter-rater reliability of the GHAT and SCFT were K = 0.68 & K = 0.65 respectively in subjects with shoulder pain. In asymptomatic subjects, the inter-rater reliability of GHAT was K = 0.61 and SCFT was K = 0.85. Intra-rater reliability ranged from K = 0.66 for GHAT to K = 0.87 for SCFT.

Conclusion: Our study found substantial agreement in inter-rater reliability of KMRT in subjects with shoulder pain, whereas substantial to near perfect agreement was found in intra-rater and inter-rater reliability of KMRT in subjects without shoulder pain.

1. Introduction

Shoulder disorders are the third most common musculoskeletal condition presenting in general practice, with a point prevalence of 7–26% (Luime et al., 2004). Symptoms are often persistent and recurrent, with 40–50% of patients reporting persistent symptoms after 6–12 months (Winters et al., 1999) and 14% of patients seeking care even after 2 years (Linsell et al., 2006).

The shoulder joint is inherently unstable by design and is dependent on neuro-muscular control for stability during function. Altered neuromuscular control appears to be a significant factor associated with shoulder pain and dysfunction (Myers et al., 2006). Hence, it is essential that management strategies for shoulder pain should include assessments directed at neuromuscular control of the shoulder. Conventional clinical tests of the shoulder are mostly designed to establish an anatomical structure based or pathology based clinical diagnosis, however, the focus of contemporary physical therapy practice for shoulder pain and disability is restoration of optimal movement and function of the shoulder (Magarey and Jones, 2003). Hence, it is appropriate to include assessments to identify movement dysfunction to help guide the treatment choices. It has been proposed that movement dysfunction can be identified and classified based on the site and direction of

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uncontrolled movement, which allows for a movement impairment diagnosis and treatment (Comerford and Mottram, 2012). Movement dysfunction of the shoulder joint present as abnormal movements of the scapulo-thoracic and gleno-humeral joints. Whereas Scapular dyskinesis is a commonly used terminology to describe abnormal movements of the scapula and there is an increased emphasis to classify scapular dyskinesis (Kibler, 1998; Kibler et al., 2009), the role of gleno-humeral muscles in controlling the humeral head movements has been explored less. Abnormal translation of the humeral head in relation to scapula during active movements has been reported in the literature (Kibler, 1998; Lukasiewicz et al., 1999). Hence, it is also essential to identify and document the humeral movement faults in shoulder dysfunction. Special tests such as the dynamic rotator instability test, dynamic relocation test, Scapular Assist test etc are routinely used in clinical practice to identify the movement faults of the shoulder. These tests are highly specific to either gleno-humeral or scapula-thoracic joints. Since both these joints work synchronously during arm movements, there is a need to identify and document abnormal movements happening at both the joints simultaneously when possible. Movement control tests are commonly used in clinical practice to identify and classify movement faults accompanying a specific movement. Kinetic Medial Rotation Test (KMRT) is a movement control test designed to identify both humeral and scapular movement faults that occur concurrently during internal rotation of the arm (Morrissey et al., 2008). KMRT assesses the patient's ability to actively dissociate and control scapular movement and glenohumeral translation during active internal rotation (Comerford and Mottram, 2012). The advantage of this test is that it can be used to identify both the scapular and humeral components using a single patient position. A recent study examined the reliability of KMRT and found the test to have fair reliability in overhead athletes with chronic shoulder pain when performed by experienced examiners (Lluch et al., 2014). The purpose of the present study was to explore the intra-rater and inter-rater reliability of KMRT among novice and experienced therapists in both subjects with and without shoulder pain. For the test to be useful, it has to be tested in different settings and by examiners with different levels of experience. As clinical decisions are usually based on repeated measures by the same or different examiners in various set ups, it is imperative to test both intra and inter-rater reliability of a clinical test in different clinical set up. The test protocol (described below) used in the present study was different from the previous one; our protocol was designed to reflect routine clinical practice with minimal use of equipment for testing. In addition, we used a mobile inclinometer to document and reproduce the benchmark angle for individual subjects.

2. Methods

The study was approved by the Srinivas College of Physiotherapy and Research Centre ethical committee and data was collected in the physiotherapy clinic located on the college premises. The subjects were recruited through flyers circulated on the college premises and patients referred to the physiotherapy clinic located on the college campus. A total of 120 subjects were screened. Among them, 45 subjects were symptomatic. Out of 45, we had included 20 symptomatic subjects. As far as the asymptomatic group was concerned, the total number of screened subjects was 75. Among them 15 subjects were excluded due to subclinical neck pain and refusal to participate. So, a total of sixty subjects were included in this study, of which 20 of them were symptomatic and 40 asymptomatic. The inter-rater reliability was tested on 20 symptomatic and 20 asymptomatic subjects. Intra-rater reliability was tested on another 20 asymptomatic subjects.

The subjects in the asymptomatic group were aged between 18 and 50 years, both the genders were included with no history of shoulder, neck and upper back pain during the preceding year. The subjects in the symptomatic group were of same age group presenting with shoulder pain during arm elevation. The subjects were excluded if the pain was referred and/or radiating from cervical and thoracic spine to the shoulder, had traumatic shoulder injury including fractures or had any neurological disorders or cuff disease causing shoulder muscle weakness and frozen shoulder contracture syndrome. Examiners involved in the study were both experienced and novice. The experienced examiner had 15 years of experience in musculoskeletal physiotherapy practice and the novice had finished his under graduation and was pursuing his masters in musculoskeletal physiotherapy. The novice examiner had undergone training on movement control tests and practiced on several subjects before commencement of the study. The order in which the examiners were selected to perform the test was decided on the basis of a lottery method with the first name on the lottery performing the test first. Since the symptomatic subjects had been tested only for the inter-rater reliability, the test was performed before treatment session by both the examiners. Intra-rater reliability was tested only by the novice physiotherapist at two week intervals between the tests. **Test procedure:** Informed consent was obtained from all participants before administering the test. Participants were positioned supine with the arm abducted to 90° and elbow flexed to 90°, then a folded towel was placed under the scapula and arm to ensure that the humerus was in scapular plane. Mobile inclinometer was fixed at the distal forearm with a strap to document the angle of shoulder internal rotation (Fig. 1).

We used Sony Experia M mobile phone with a clinometer applications (Plaincode Software solutions, Stephanskirchen, Germany). Readers could find the reliability of mobile goniometer for shoulder range of motion elsewhere (Shin et al., 2012). KMRT test was familiarised to the subjects through tactile, verbal and auditory cues. The test was performed after the subjects had learnt the correct procedure of the test. The examiner placed his index finger over the head of humerus and middle finger over the coarocoid process and the subject was asked to perform internal rotation of the shoulder while maintaining the proximal shoulder position. While performing the movement, the examiner would look for an aberrant anterior tilting of scapula and/or excessive anterior translation of humeral head before 60 degrees of internal rotation (Fig. 2). If any one or both of those abnormal movements were present, then the test would be positive. If both of them were

Fig. 1. Measuring shoulder internal rotation by mobile inclinometer.