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Original article

Convergent validity of the Timed Up and Go test and Ten-metre Timed Walk Test in pregnant women with pelvic girdle pain

Natalie Michelle Evensen*, Alice Kvåle, Ingeborg Hoff Brækken

University of Bergen, Department of Public Health and Primary Health Care, Bergen, Norway

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ABSTRACT

Pregnant women with pelvic girdle pain (PGP) often experience functional difficulties, in particular walking difficulties. Currently, however, there is a lack of validated performance-orientated outcome measures available for use in this population. The Timed Up and Go (TUG) test and Ten-metre Timed Walk Test (10 mTWT) are two short-distance walking tests that have demonstrated reliability in pregnant women with PGP, but as yet have no established validity. The aim of the present study was to evaluate the convergent validity of the TUG and 10 mTWT by comparing performances on these two walking tests with scores achieved on the Active Straight Leg Raise (ASLR) test and the Pelvic Girdle Questionnaire (PGQ). Eighteen pregnant women with PGP aged 31.4 years (SD = 2.7) and 28.9 weeks pregnant (SD = 7.3) were included. Spearman rank correlation coefficient (r_s) was used to determine convergent validity. Strong correlations were found between the TUG and ASLR ($r_s = 0.73$, $p = 0.001$), and the 10 mTWT and ASLR ($r_s = -0.65$, $p = 0.003$). Relationships between the TUG and PGQ were moderate ($r_s = 0.41$ to 0.52) and between the 10 mTWT and PGQ low to moderate ($r_s = -0.25$ to -0.56). The strong relationships between the walking tests and the ASLR may suggest these tests all assess the same construct. The weaker relationships found between the walking tests and the PGQ may be related to the self-report and multiple functional activities nature of the questionnaire. This study found both the TUG and 10 mTWT to be valid weight-bearing physical performance measures, although more research is warranted due to the small study sample.

1. Introduction

Pelvic girdle pain (PGP) most frequently onsets during pregnancy, affecting approximately 20% of all pregnant women (Vleeming et al., 2008). Women with this condition often experience difficulties with weight-bearing activities, in particular walking difficulties (Hansen et al., 1999; Stuge et al., 2011). Approximately 73% of pregnant women with PGP report impaired mobility (Hansen et al., 1999; Stuge et al., 2011), with those severely affected requiring crutches (Robinson et al., 2007). The pain and functional ramifications of this condition have an adverse effect on quality of life (Gutke et al., 2006; Mogren, 2006) and are a common cause of sick leave during pregnancy (Robinson et al., 2006; Myklebø and Thune, 2010).

Disability and function are of primary focus in the clinical evaluation of pregnant women with PGP (Stuge et al., 2011). Despite this, there have been very few outcome measures specifically designed and validated in this population (Vleeming et al., 2008). The European guidelines for the diagnosis and treatment of PGP recommend only one objective functional test of the pelvis- the Active Straight Leg Raise (ASLR) (Vleeming et al., 2008). These guidelines also highlight that functional questionnaires used in intervention studies of PGP, such as the Quebec Back Pain Disability Scale (QBPDS) (Kopec et al., 1995), Disability Rating Index (DRI) (Salen et al., 1994), and Oswestry Low Back Pain Disability Questionnaire (Fairbank et al., 1980), have been suboptimal given they were specifically designed and validated for patients with low back pain (LBP) (Vleeming et al., 2008). In response to the need to develop suitable outcome measures to assess functional status, the Pelvic Girdle Questionnaire (PGQ) was developed (Stuge et al., 2011) and reliability and validity established in women with pregnancy-related PGP (Stuge et al., 2011; Grotle et al., 2012). The PGQ assesses activity limitations

* Corresponding author. Centrum Fysioterapi Ski DA, Torgveien 2, 1400 Ski, Norway. Tel.: +47 93 66 65 48; fax: +47 64 86 28 84.
E-mail address: nataliemevensen@gmail.com (N.M. Evensen).

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via a 20-item activity subscale, and symptoms via a 5-item symptom subscale. Included are questions regarding functional activities that are often difficult for women with PGP, for example: 'pushing a shopping cart', 'leg/s giving way', and 'pushing something with one foot' (Stuge et al., 2011).

With the exception of the ASLR, most clinical tests for PGP are pain-provocation tests undertaken in a non-weight-bearing position that cannot be used as outcome measures. Until recently there has been no objective performance-orientated outcome measure available that assesses activity-limitation in pregnant women with PGP. In 2014, Evensen and colleagues investigated the reliability of two short-distance walking tests in pregnant women with PGP- the Timed Up and Go (TUG) test and Ten-metre Timed Walk Test (10 mTWT). The TUG demonstrated excellent test-retest (ICC = 0.88; 95%CI = 0.70–0.95) and intertester reliability (ICC = 0.95; 95%CI = 0.84–0.98), and the 10 mTWT good test-retest (ICC = 0.74; 95%CI = 0.42–0.90) and excellent intertester reliability (ICC = 0.94; 95%CI = 0.82–0.98). Before outcome measures can be used in the clinical setting, however, they need to have established validity in the population in which they are intended to be used. Convergent validity refers to the degree to which a measurement correlates with another measurement that ostensibly assesses the same construct (Pallant, 2010). The purpose of this study was to examine the relationships between performances on the TUG and 10 mTWT with scores achieved on the ASLR (Mens et al., 2001) and PGQ (Stuge et al., 2011) in pregnant women with PGP. We hypothesized that strong relationships (>0.6) would exist between performances on each of the walking tests with the ASLR, and that low (<0.3) or moderate correlations (0.3–0.6) (Grotle et al., 2012) would be found between performances on the walking tests and the PGQ. The null hypothesis was that there were no relationships between the variables.

2. Methods

2.1. Subjects

A convenience sample of 25 pregnant women enrolled in the study. Subjects were recruited by advertisements on a pregnancy website, at two community health centres, and two physiotherapy clinics in the city of Oslo (Norway). The study inclusion required that the subject's symptoms had onset during the current or a previous pregnancy and that symptoms were located to the buttock region (distal or lateral to the L5-S1 area) and/or the pubic symphysis. In addition, participants needed to test positive on at least 3 of 7 clinical tests for PGP, based on recommendations by the European guidelines for the diagnosis and treatment of PGP (Vleeming et al., 2008) and past studies (Robinson et al., 2007; Vøllestad and Stuge, 2009; Robinson et al., 2010a; Stuge et al., 2011). A positive test on either the Posterior Pelvic Pain Provocation test (Östgaard et al., 1994; Robinson et al., 2007) and/or ASLR (score >0) (Mens et al., 2001; Robinson et al., 2010a) was a requirement, together with at least two of the following tests: Patrick's Faber (Kokmeyer et al., 2002; Robinson et al., 2007), Compression (Maigne et al., 1996; Robinson et al., 2007), Distraction (Maigne et al., 1996), pain provocation of the long dorsal sacroiliac ligament (Vleeming et al., 2002), or Gaenslen's test (Maigne et al., 1996; Kokmeyer et al., 2002). Subjects were excluded if they had: other health issues that could affect gait; gynaecological or urological conditions that could mimic PGP; pregnancy complications that could put the mother or baby at risk by participating; insufficient proficiency in the Norwegian language; or significant visual, auditory or cognitive disorders that could compromise testing. Subjects presenting with concomitant LBP underwent clinical assessment to ensure their presenting symptoms were not referred from the lumbar spine (Evensen et al., 2014). Ethics approval was obtained from The Regional Committee for Medical Research Ethics in Norway and written informed consent obtained from participants prior to commencement of the study. This study complied with The Code of Ethics of the World Medical Association (Declaration of Helsinki) (WMA, 2008).

2.2. Procedures

The women first filled out a pain drawing highlighting their symptomatic region(s) and completed a questionnaire on their background and health that contained information relevant to the study inclusion and exclusion criteria. The PGQ was then administered and completed forms placed in a sealed envelope. Subjects were systematically allocated to either Group A or Group B for gait testing. Group A commenced testing on the TUG. Group B were tested on the 10 mTWT first. After a demonstration of each walking test, subjects were allowed a practice trial followed by one timed trial. A five-minute rest period was given between walking trials and walking aides permitted if required. A Cielo Professional Stopwatch (Model No. WT035) was used to time performances to the nearest one-hundredth of a second. Following gait testing, the seven clinical tests for PGP were undertaken (including the ASLR). These tests were administered by an experienced manual therapist who also validated pain drawings using a procedure by Robinson et al. (2010a). The primary investigator administered the walking tests. Both therapists involved in testing were blind to all other data collected during the study.

2.3. Outcome measures

2.3.1. Timed Up and Go test

The TUG (Podsiadlo and Richardson, 1991) required the participant to sit on a 46 cm high chair with their back against the back-support of the chair, their arms resting on the armrests and their toes up against a white tape start line on the floor. Another white tape line was placed three metres away from (and parallel to) the start line. The instructions given to subjects were based on the Norwegian version of the TUG (Botolfsen and Helbostad, 2010). Translated into English, the instructions were: 'After "Ready, Set, Go" stand up and walk as fast as you can until you cross the white line, turn around, and walk back to the chair and sit down again' (Evensen et al., 2014). Timing of the test commenced on the word "go" and ended when the subject's buttocks made contact with the chair again after the walk (Botolfsen and Helbostad, 2010; Evensen et al., 2014).

2.3.2. Ten-metre Timed Walk Test

The 10 mTWT (Dean et al., 2001) required the subject to walk as fast as they could along a 14-m walkway. White tape markers were placed at 0 m, 2 m, 12 m and 14 m along the walkway. The time taken to walk the middle 10-m was recorded to the nearest one-hundredth of a second using a stopwatch. The instructions given to participants were: 'After "Ready, Set, Go" walk as fast as you can up to the last white line without stopping or speaking along the way' (Evensen et al., 2014). Timing of the test commenced when the subject's first foot crossed the 2-m line and ended when their first foot crossed the 12-m line. Performance times were later converted into speed in metres per second.

2.3.3. Active Straight Leg Raise test

The ASLR (Mens et al., 2001) was performed with the subject in supine with their feet approximately 20 cm apart. A 20 cm long ruler was used to guide subjects as to how high to lift their leg up

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