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ORIGINAL ARTICLE

Influence of dominant- as compared with nondominant-side symptoms on Disabilities of the Arm, Shoulder and Hand and Western Ontario Rotator Cuff scores in patients with rotator cuff tendinopathy

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Hypothesis and background: The Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire and the Western Ontario Rotator Cuff (WORC) index are 2 widely used patient-reported questionnaires in individuals with rotator cuff (RC) tendinopathy. In contrast to the WORC index, for which the items are specific to the affected shoulder, the items of the DASH questionnaire assess the ability to perform activities regardless of the arm used. The objective of this study is to determine whether scores on the DASH questionnaire and WORC index are affected if the symptoms are on the dominant or nondominant side in individuals with RC tendinopathy. Given the number of items that can be influenced by dominance, the hypothesis is that DASH scores will be impacted by the side of the symptoms.

Methods: Individuals with RC tendinopathy (N = 149) completed questions on symptomatology and hand dominance, the DASH questionnaire, and the WORC index. Differences in total scores (independent *t* test) and single items (Wilcoxon rank sum test) were compared between groups of participants with dominant-side symptoms and those without dominant-side symptoms.

Results: No significant differences were observed for WORC or DASH total scores when comparing participants with and without symptoms on their dominant side. Single-item comparison revealed more items being affected by symptom side on the DASH questionnaire (6 of 30 items) than on the WORC index (2 of 21 items).

Conclusions: The side of the symptoms does not influence the DASH and WORC total scores, as there are no systematic differences between individuals with and without symptoms in their dominant

The Ethics Committee of the Quebec Rehabilitation Institute approved this study (No. 2015-456).

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shoulder. However, the presence of dominant symptoms does influence item scores more on the DASH questionnaire than on the WORC index.

Level of evidence: Basic Science Study; Validation of Outcome Instruments

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Individuals with rotator cuff (RC) tendinopathy, the most prevalent shoulder pathology,¹³ usually pursue rehabilitation or medical treatment to relieve symptoms and reduce functional limitations. Patient-reported outcomes are used in clinical practice and research to quantify the impact of these deficiencies on the patients with RC tendinopathies.⁷ In fact, patient-reported outcomes are important assessment tools for clinicians to use for decision making, assessment of progress, and evaluation of the effectiveness of interventions.^{3,7} Understanding the ability of patient-reported outcome tools to assess symptoms and functional limitations is critical to the appropriate use for patients with RC tendinopathies.

One of the most widely used patient-reported questionnaires in individuals with RC tendinopathy is the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire. The DASH questionnaire was developed to measure physical disability and symptoms of the upper extremities in people with upper extremity disorders.¹⁴ The 30 items of the DASH questionnaire assess (1) difficulty in performing various physical activities that require upper extremity function (21 items); (2) symptoms of pain, activity-related pain, tingling, weakness, and stiffness (5 items); and (3) the impact of disability and symptoms on social activities, work, sleep, and psychological well-being (4 items). The items of the DASH questionnaire were developed to evaluate physical disabilities, without being attributed to the affected limb.⁴ In fact, the instruction given for completing the DASH questionnaire is, "It doesn't matter which hand or arm you use to perform the activity; please answer based on your ability regardless of how you perform the task."⁴ The goal of the DASH questionnaire is to determine upper extremity disability by assessing the individual's ability to perform activities regardless of which arm, shoulder, or hand he or she uses. For items such as "Open a tight or new jar," "Turn a key," "Place an object on a shelf above your head," or "Change a light bulb overhead" that are mostly performed with the dominant arm, the scores could be influenced by the side affected. Therefore, individuals with symptoms in their nondominant shoulder may have lower disability scores on the DASH questionnaire than those with symptoms in their dominant shoulder. The approach of the DASH questionnaire to assess overall upper extremity disability may make it difficult to compare or combine individuals with or without symptoms on their dominant side.

Another questionnaire that is widely used in individuals with RC tendinopathy is the Western Ontario Rotator Cuff (WORC) index, a disease-specific questionnaire specifically designed for this population.⁶ The 21 items of the WORC index are divided

into 5 sections: physical symptoms (6 items), sports/recreation (4 items), work (4 items), lifestyle (4 items), and emotions (3 items). In contrast to the DASH questionnaire, the items on the WORC index are specific to the affected shoulder. For example, the instructions for the physical symptoms section are, "The following questions concern the physical symptoms you have experienced due to your shoulder problem. In all cases, please enter the amount of the symptom you have experienced in the last week."⁶ Therefore, the impact of dominance on the WORC score should be diminished as the affected shoulder is specifically targeted for assessment.

The objective of this study is to determine whether the scores on the DASH questionnaire and WORC index are affected if the symptoms are in the dominant or nondominant shoulder in individuals with RC tendinopathy. Given the number of items that can be influenced by dominance, the hypothesis is that DASH scores will be more impacted by dominance than WORC scores.

Materials and methods

Participants

Individuals aged between 18 and 65 years with unilateral RC tendinopathy were recruited through the electronic mailing list of employees and students at Université Laval, as well as in medical and physical therapy clinics located in Quebec City, QC, Canada. Participants were considered eligible if they had at least 1 positive sign in each of 3 diagnostic test categories (painful arc of movement, Neer or Kennedy-Hawkins test, and pain on resisted isometric lateral rotation or abduction or on the Jobe test). The diagnostic accuracy of the combination of these orthopedic tests is established for symptomatic RC tendinopathy.⁸ The exclusion criteria were (1) a history of shoulder or cervicothoracic fracture or surgery; (2) cervicobrachialgia or shoulder pain reproduced by neck movement; (3) clinical signs of shoulder capsulitis (restriction of $\geq 30\%$ in ≥ 2 directions) or a full-thickness RC tear (positive drop-arm test, external rotation lag test, lift-off test)²; and (4) rheumatoid, inflammatory, or any neurologic diseases. All participants gave their written consent after being informed of the nature and purpose of the study.

Study design

Included participants took part in 1 evaluation session during which they initially completed sociodemographic and symptomatology questionnaires. Hand dominance was determined using the revised Edinburgh Handedness Inventory.⁹ Thereafter, the participants filled out the DASH questionnaire and WORC index.

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