Effect of Instructions to Simulate a Back Injury on Torque Reproducibility in an Isometric Lumbar Extension Task

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The purpose of this study was to investigate the differences in test-retest reliability between maximal and “simulated back injury” efforts in an isometric lumbar extension task and to test the hypothesis that voluntary attempts to “simulate” a back injury would yield less consistent torque production than maximal efforts. Twenty subjects were asked to undergo lumbar extensor testing at seven different positions in a lumbar extension machine. Each subject was tested twice in a maximal effort condition and twice with instructions to “simulate” a back injury. The order of the conditions was counterbalanced across subjects so that half of the subjects performed the maximal effort tests first and half performed the “simulated” effort first. Results indicated high test-retest correlations at all angles in both conditions. There were no differences in test-retest reliability between effort conditions. Therapist ratings of consistency did not differ between conditions and therapists could not discriminate between conditions on the basis of effort consistency. In the “simulated” condition subjects produced reliable, submaximal torque plots consistent with previous data indicating similar reliability at submaximal levels. It was concluded that use of test-retest torque consistency as a measure of sincerity of effort is premature and may be misleading.

KEY WORDS: back strength; reliability assessment; faking.

INTRODUCTION

Assessment of lumbar extensor force production in the evaluation of low back pain has become widespread and employs a number of different devices (1-5). In addition to investigating the status of the lumbar musculature, it has been suggested

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that the reliability of force production from this musculature may be an indicator of sincerity of effort (1, 6, 7). Hirsch et al. (8) demonstrated relationships between a number of biomechanical measures and symptom magnification as measured by Waddell signs. Measures of the variability of torque production and range-of-motion were positively related to number of Waddell signs. The authors cite negative affect, unconscious and volitional symptom magnification, and nociception as possible explanations for the biomechanical abnormalities seen in the absence of organic impairment. These results are encouraging and highlight the importance of non-organic components to symptom report and biomechanical testing. Their study did not, however, directly address the impact of volitional attempts at symptom magnification on torque consistency because of the study's correlational design.

There is little evidence to support the underlying assumption of the consistency hypothesis which is that submaximal efforts cannot be as reliably reproduced as well as maximal voluntary efforts. McIntyre and associates (4, 5) have shown that LBP patients consistently reproduce their preferred lumbar spine motions, though they may differ from controls in range of motion (ROM) and/or velocity. These studies, using a dynamic, isoinertial exercise task, suggest that though CLBP and normal groups may differ in terms of ROM and velocity measures, they remain consistent across repetition in their preferred movement style. Furthermore, in contradiction to the inconsistency hypothesis, asymptomatic normals became less consistent as workout resistance increased.

Hazard et al. (6) were the first to directly test the hypothesis that submaximal efforts would be less consistent than maximal efforts. The authors asked subjects to perform isokinetically at maximal (100%) and submaximal (50%) efforts in both a lift task and trunk extension task. The authors report modest ability to correctly classify degree of effort with simple visual inspection of the force curves. They were able to improve their classification rate with sophisticated discriminant analysis techniques. While these results are encouraging the authors note that clinical observation during the study was more accurate than the measures of curve variability. In addition, they noted that some subjects were able to produce consistent submaximal curves and conversely, that others produced inconsistent maximal effort curves, suggesting there is considerable between subject variability.

Robinson et al. (7) examined the reproducibility of force production in an isometric lumbar extension task and concluded that submaximal (50%) efforts were as reliable as maximal efforts. In addition, experienced therapists could correctly identify maximal or submaximal efforts at only chance levels.

Asking subjects to produce a 50% effort may have implied that they should be consistent in test-retest efforts. Individuals attempting to exaggerate or deceive examiners in these tasks may not have any demand to be consistent and therefore may produce less consistent torque values.

In an isometric grip strength task, Niehbur and Marion (9) gave subjects instructions on how much effort to produce in a "fake" condition. With proper instruction, subjects could successfully feign the normal, bell-shaped force curve seen in maximal efforts. Their conclusions indicate that simple grip strength measurements are not sensitive to differences in strategies employed by subjects and therefore the method is limited for the detection of insincere effort.