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Study on Sorensen Method among Other Back Functional Measures

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Abstract – The Sorensen test is the method most frequently investigated and reported in the literature. Among other back functional measures, Biering-Sorensen4 describes this method of testing isometric back endurance; it measures how long (to a maximum of 240 seconds) the subject can keep the unsupported trunk (from the upper border of the iliac crest) horizontal while prone on an examination table. During the test, the buttocks and legs are fixed to the table by 3 wide canvas straps and the arms are folded across the chest. The subject is asked to maintain the horizontal position until he or she can no longer control the posture or has no more tolerance for the procedure or until symptoms of fatigue are reached. Several authors report using Bering-

Key Words; Frequently, Investigated, Isometric, Back Endurance.

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INTRODUCTION

Sorensen's exact method for clinical studies.3,4,6,8-15 A number of other studies involve minor variations of the Sorensen test. Some of these variations include placing the hands on the head, using fewer than 3 straps to support the subject, and using devices such as an inclinometer on the subject's back to determine when the horizontal position has been breached. These variations have been referred to collectively as *modified Sorensen tests.* Endurance has been studied. Most commonly, these are (1) Several types of methods of testing spinal muscle measures of isometric, or static, endurance, (2) active measures of endurance within a nonfixed range of motion (isotonic), and (3) isokinetic testing that places subjects in a fixed range of motion as well as a fixed rate of joint motion acceleration. Of the assessment strategies available, isometric endurance testing seems to be cost-effective and requires little equipment for testing.

REVIEW OF LITERATURE

According to the literature, the mean extensor endurance time for mixed-sex groups ranges from 77.76 to 129 seconds in healthy subjects.23,24,28,29 On average, women have longer extension endurance times than men . For men, the mean endurance time is 84 to 195 seconds; for women, it is 142 to 220.4 seconds. For subjects with LBP, the mean endurance time range is 39.55 to 54.5 seconds in mixed-sex groups,26,29 80 to 194 seconds for men, and 146 to 227 seconds for women.

Alaranta et al16 provide a data chart for the Sorensen test that combines the results of testing pain free subjects and the results of testing LBP subjects; this might represent some measure of social validity for the test According to the literature, the Sorensen procedure appears to provide a global measure of back extension endurance capacity. During the Sorensen test, the multifidus demonstrates more electromyographic activity32 and faster fatigue rates than the iliocostalis lumborum.32,33 This observation is attributed to the higher level of activity of the multifidus during trunk extension as well as to the fact that the multifidus is responsible for counteracting forces in the sagittal plane, whereas force contributions from the iliocostalis lumborum are more likely in the frontal plane.32 In addition, when electromyography (EMG) and acoustic myography are used in healthy subjects, the paraspinal muscles demonstrate symmetric activity at the L4 level.31 However, controversy exists as to the amount of endurance that is provided by the lumbar extensors in contrast with the hip extensor muscles. Most authors state that the hip extensors contribute to the performance of the test; according to published EMG recordings, the contributions to endurance time range from not significant30 to strong.20 Moffroid et al26,27 find a significant positive correlation between EMG median frequency slopes of the biceps femoris and Sorensen test results.

Objective: To review the literature that describes and evaluates the use of isometric back extension endurance tests.

MATERIAL AND METHOD

We chose to focus on isometric endurance assessment; we felt that if there was evidence to support it as a clinically useful and valid procedure, it would be the type of testing that clinicians would choose to use to measure spinal muscle endurance. We also explored the literature for evidence regarding the endurance of the lumbar spine extensors specifically, because many methods are purported to test the lumbar spine extensors.4-7

The purpose of this study was to review the literature that investigates the use of isometric back extension endurance testing. Different testing methods and evidence regarding their utilization are presented in this review.

Key search terms were *back muscle endurance, isometric back endurance, trunk extensors, back muscle performance, and Sorensen test.*

Data Synthesis: The principal criterion for inclusion was as follows: any study that discussed or tested an isometric type of back endurance extension test. Studies that were excluded did not use an isometric testing protocol. Thirty-seven of the initial studies are included in this review.

Results: Six different types of isometric back extension endurance testing methods were found. Three of these procedures require special testing devices. Much of the research on this topic has centered on a procedure known as the *Sorensen test*. Normative databases have been established for the Sorensen test and 2 other test types. Validity and reliability have been assessed for some of the procedures.

CONCLUSIONS

The influence of motivation and effort exerted by the subject are limiting factors in all of the tests reviewed. These psychologic factors warrant further research. On the basis of the literature reviewed, we determined that the Sorensen is probably the most clinically useful of these tests; it is easy to perform, requires no special equipment and enjoys the most support from the literature. Sorensen test fatigues the biceps femoris more than the erector spinae and that it indicates more about the endurance of the hip extensors than about that of the trunk extensors. Probably the most controversial aspect of the Sorensen test is the claim of its ability to identify people who will have LBP in the future.4 Three studies investigate this issue directly.4,23,17 In the original study of 928 subjects (449 men and 479 women), Biering-Sorensen4 investigates whether indicators of prognostic value for LBP are identifiable by

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