COMPARISON OF TRUNK STIFFNESS PROVIDED BY DIFFERENT DESIGN CHARACTERISTICS OF LUMBOSACRAL ORTHOSES.

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BACKGROUND: Lumbo sacral orthoses (LSOs) are class I medical devices that are used in conservative and postoperative management of low back pain. The effectiveness of LSOs depends on their design aimed at enhancing trunk stiffness. Therefore, the purpose of this study was to compare two lumbar supports: extensible (made of neoprene and lycra) and non-extensible (made of polyester and nylon). **METHODS:** Trunk stiffness and damping was estimated from trunk displacement data in response to a quick force release in trunk flexion, extension, and lateral bending. Fourteen male and 6 female subjects performed five trials at each experimental condition: (1) No LSO, (2) extensible LSO, (3) non-extensible LSO, (4) non-extensible LSO with a small rigid front panel, and (5) non-extensible LSO with a large rigid front panel. Testing order was randomized and the LSOs were cinched to a pressure of 70 mmHg (9.4 kPa) measured between posterior aspect of the iliac crest and the orthosis. **FINDINGS:** The non-extensible LSO reduced trunk displacement by 14% and increased trunk stiffness by 14% ($P<0.001$). The extensible LSO did not result in any significant change in trunk displacement or stiffness. The addition of rigid front panels to the non-extensible LSO did not improve its effectiveness. The trunk damping did not differ between the LSO conditions. **INTERPRETATION:** A non-extensible LSO is more effective in augmenting trunk stiffness and limiting trunk motion following a perturbation than an extensible LSO. The rigid front panels do not provide any additional trunk stiffness most likely due to incongruence created between the body and a brace.

SELECTED QUOTATIONS

Introduction

"…Cochrane Back Review Group concluded that there is some evidence suggesting that lumbar supports are an effective treatment for LBP...reduction in low level, tonic muscle activity sustained during postural tasks, could alleviate some of the symptoms associated with muscle fatigue and pain. Based on this theory, the extent to which a brace can be effective will depend on its design aimed at enhancing trunk stiffness."

Discussion

"Non-extensible LSOs (Aspen Medical Products, Irvine, CA) increased trunk stiffness and limited trunk motion after a perturbation, while the extensible LSOs did not have any such significant effects.

Muscles and other soft tissues change the contour of the body as various trunk motions take place. This complex interaction between the soft tissue and a brace must be taken into consideration when optimizing the brace design."