Scoliosis

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Front packs: is 15% safe? Evaluation of the effect of different front pack loads on 3D back shape and posture in asymptomatic young adults

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Introduction

Load carriage is a significant factor in the aetiology of back pain. Front load carriage in particular, is a significant problem in obese individuals, as well as pre and post pregnancy in women. Further, carrying a frontpack is routinely used within some industries such as agriculture and construction. Whilst the focus of much of the literature is on backpacks, little is known on the effects of a front pack. The load carriage recommended for children found in the literature is 10% body weight (Moore et al, 2006). However load limits for adults are controversial ranging from 10-20% body weight. The objective of this study was to evaluate the effect of a 10%, 15% and 20% frontload on standing backshape and posture in asymptomatic young adults.

Materials and methods

The Integrated Shape Imaging System 2 (ISIS 2) was used in this study. This is a low cost automated system, that measures the three-dimensional shape of the back in patients with scoliosis and is described in detail elsewhere (Berryman et al, 2008). The study involved twenty-five students from the School of Health and Social care, Teesside University. A repeated measures design was used to record the effects of four conditions using a front pack: No load [reference], 10% body weight, 15% body weight and 20% body weight on the subjects standing posture for five minutes, using the ISIS 2. All of the conditions were randomised to offset any order effects.

Results

The results of the present study showed that in the sagittal plane, the mean overall lordosis and kyphosis angles increased with increasing load ($p<0.05$). Back length and extension also increased significantly from the no load position to the 20% ($p<0.05$) loaded posture. No statistically significant differences however were found in each of the following variables ($p>0.05$); lateral asymmetry (curvature) in the thoracic and lumbar spine and in the horizontal Max Skin Angle variable.

Discussion

The use of a front packs results in a more upright posture. These findings are similar to those of studies conducted previously, using a front pack. However as expected the results also demonstrate changes in the opposite direction to those found in studies involving backpacks.

Conclusion

It was concluded that increasing the load to greater than 10% body weight, whilst using a front pack, has a significant effect on an individuals standing posture. The results also suggest that overloading frontpacks may cause significant injuries to the back and surrounding musculoskeletal structures.

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