NO SINGLE LIFTING TECHNIQUE MINIMIZES LOW BACK LOAD

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INTRODUCTION

From the epidemiological literature, lifting emerges as an important cause of low back injury and low back pain [1], likely due to the high mechanical loads on the low back that lifting causes. To prevent low back injuries, several lifting techniques have been advised in practice. However, some of the techniques advised do not appear to consistently reduce back load [2,3] and other techniques have not been studied. The aim of the present study was to compare low back load during lifting with four different techniques under varying task constraints.

METHODS

In a repeated measures design, twelve healthy young males lifted 20 kg loads. Subjects used four techniques (stoop, squat, straddle, and archer's technique; Figure 1). Load widths of 0.30 and 0.60 m were used. In addition, loads were lifted from an initial hand position 0.05 and 0.29 m above floor level.

3D kinematics, ground reaction forces and EMG of selected trunk muscles were measured. These data in combination with anthropometrical measurements were used to estimate net moments around L5S1 and to estimate compression and shear forces acting at L5S1 using previously described methods [4].

RESULTS AND DISCUSSION

Description of the results will in this abstract be limited to peak total (3D) net moments, since these not only reflect the overall outcomes in the present experiment fairly well, but in general appear to be predictive of peak spinal compression and anterior shear forces [5].

Peak net moments were significantly affected by main effects of technique, hand position, and load width and by both two-way interactions with technique. Post-hoc comparisons between techniques for each hand position / load width condition separately indicated the following. For low-lying narrow loads, no differences in back load occurred between techniques. For low-lying wide loads, squat and straddle techniques caused higher back loading than stoop and archer's techniques. For high and narrow loads the stoop technique caused the highest back load, while the other techniques did not differ from each other. For high and wide loads all differences between techniques were significant. The squat technique caused the highest and the archer's technique the lowest back load. Differences in trunk inclination as well as the distance between load and the low back appear to explain the effects found.

Differences between lifting techniques within hand position and load width conditions ranged from 10 to 50 Nm or approximately 20%. Differences between low and high hand positions within techniques and load widths ranged from 6 to 35 Nm. Differences between load widths within techniques and hand positions ranged from 16 to 70 Nm.

The interactions found are in line with findings from an earlier study on self-selected, squat, and stoop techniques [3]. This result implies that, although differences between techniques were substantial in some cases, no single lifting technique can be advised and that other aspects than lifting technique merit attention in prevention. Furthermore, the results strongly supports an approach towards lifting technique in which subjects are taught a problem solving approach, which allows them to deal with the highly varying task constraints encountered in practice, rather than a single strategy [6].

CONCLUSIONS

Back load in lifting is affected by interactions of lifting technique and other task constraints, implying that no single technique can be advised.

REFERENCES

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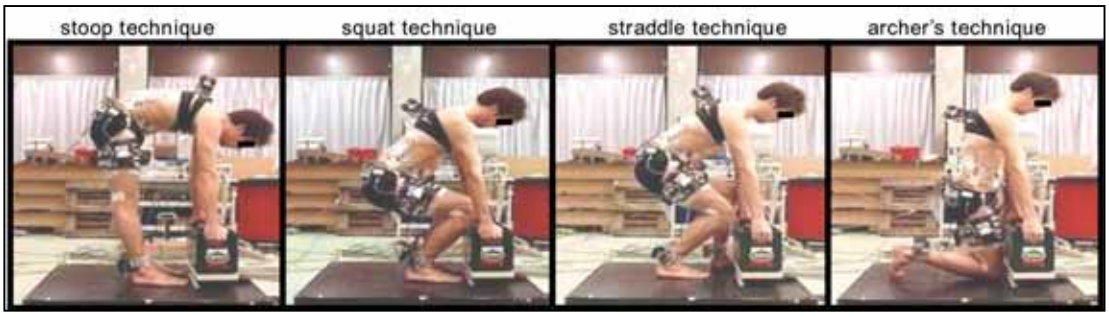

Figure 1: The four lifting techniques studied demonstrated by a subject lifting a wide load from 0.29 m.