DEADLIFT STRENGTH AND EMG UNDER STABLE AND UNSTABLE SITUATIONS

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Introduction

Despite the fact that, initially, unstable surface training was reserved for rehabilitation programs, today this type of training is included in strength and conditioning programs. Currently, the use of these devices has been incorporated into traditional exercises to promote neuromuscular coordination and patterns of neuromuscular recruitment and reduce the rate of injury, but there is much disagreement on the effects of this combination for sport performance and for core stability activation.

Objective

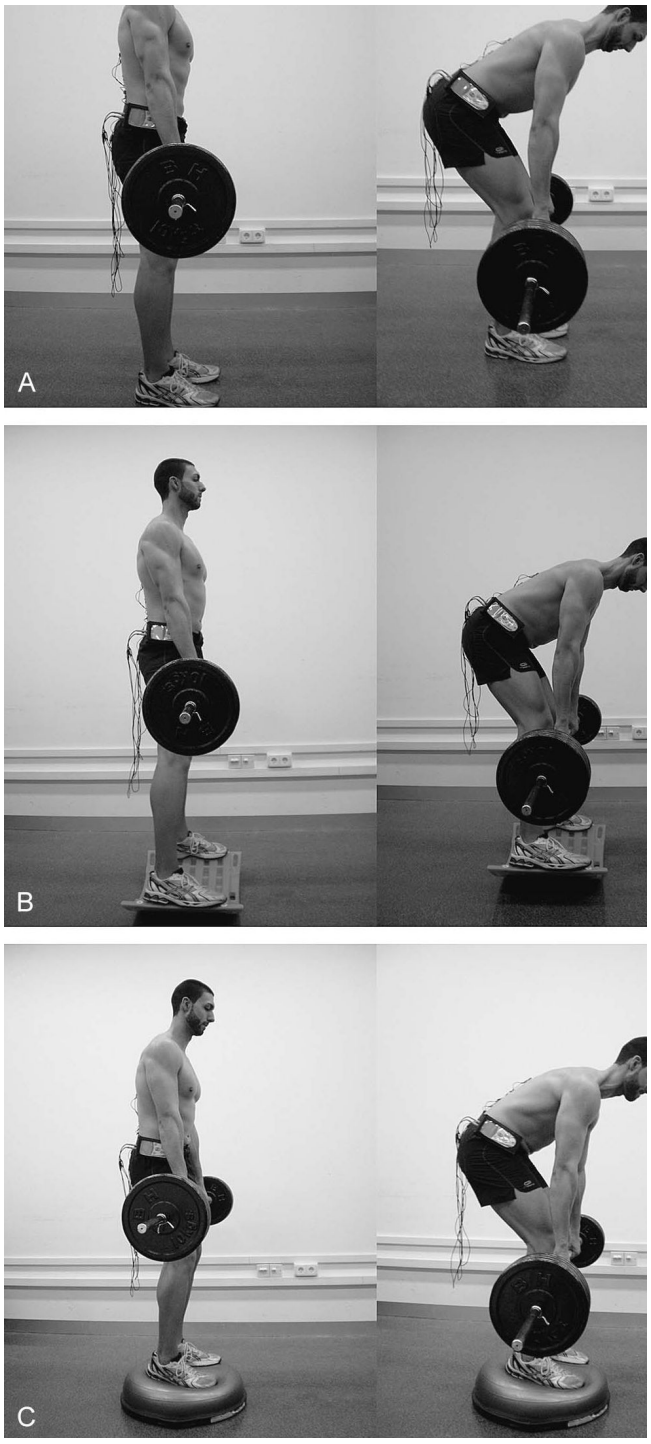
The aim of this study was to compare the strength and paraspinal muscle activity between deadlifts carried out in a standard way and with different instability devices (Bosu and T-Bow).
This is the first study that has compared force and myoelectric activity reached during the performance of deadlifts in 3 different conditions of stability, each one representing a different degree of unbalance. This was achieved through the performance of deadlifts in the stable condition, with the use of a T-Bow that causes instability in 1 direction (with reactivity applied to many sport and daily-life surfaces), and with the use of Bosu that causes unbalance in all directions (with reactivity applied to a few soft surfaces).

Subject

Thirty-one subjects (24.29 6 0.48 years; 167.98 6 8.11 cm; 79.08 6 2.37 kg), all students from the School of Sciences of Physical Activity and Sports at the University of Valencia (Spain) with 1 year of minimum experience in strength training, participated voluntarily in this study.

Methods

The maximal isometric effort (maximum isometric voluntary contraction [MIVC]) and dynamic effort (70% MIVC) when performing deadlifts with an Olympic bar were evaluated under both the stable and unstable conditions using Bosu and T-Bow devices. Surface electromyography (SEMG) activity of the lumbar multifidus spinae (LM) and thoracic multifidus spinae (TM) and the lumbar erector spinae (LE) and thoracic erector spinae (TE) was recorded under isometric and dynamic test conditions in addition to force signals during the isometric condition test.
Deadlifts involve the performance of muscle activities with dynamic and isometric characteristics.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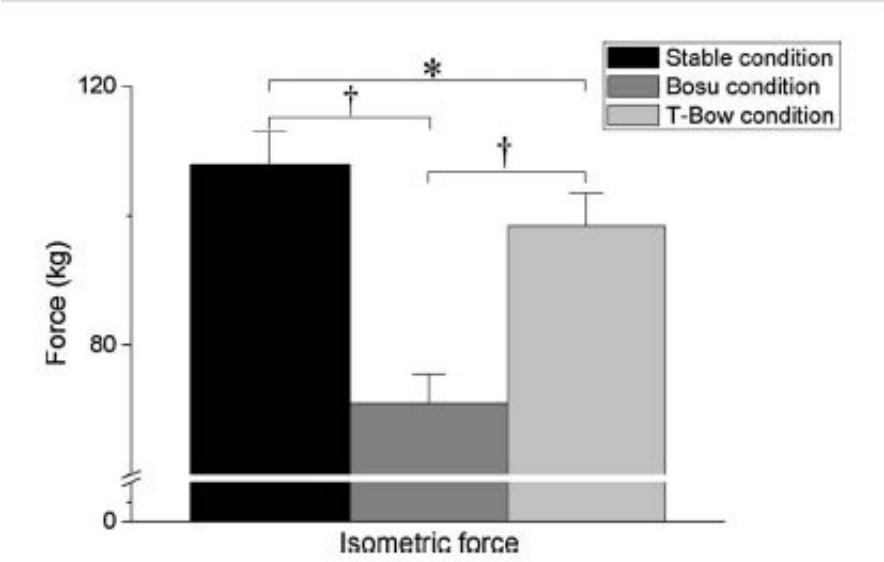
Results

The subjects produced more force and muscle activity on the stable surface than under the other conditions during the isometric test (p,0.05), and the same differences in muscle activity were observed during the dynamic test (p ,0.05). On the other hand, in the T-Bow device trial, the maximum isometric force and the maximum dynamic and isometric RMS was larger than in the Bosu condition (p , 0.001).



Deadlift force production differences between conditions.
Each bar represents the mean, and the error bars the SEM.
***Significant difference (p , 0.05) between groups. †Significant difference (p , 0.005) between groups.**

TABLE 1. Surface electromyography comparisons between conditions.*

Variable	Stable condition	T-Bow condition	Bosu condition
Maximum isometric activation	107.74 (4.53)†	91.62 (4.15)	96.77 (4.23)
Mean isometric activation	102.26 (4.09)†	81.57 (3.64)	84.13 (3.38)
Maximum dynamic activation	117.38 (5.49)†	102.02 (5.77)‡	91.05 (4.41)
Mean dynamic activation	88.53 (2.97)†	72.51 (2.31)	71.78 (2.55)

*Data are expressed as mean (*SEM*) in percentage of the maximum isometric activation during back extension ($n = 31$).
†Significant differences ($p < 0.05$) related to T-Bow and Bosu conditions.
‡Significant differences ($p < 0.05$) related to the Bosu condition.

Conclusions

These data show that the performance of deadlifts under stable conditions favors a higher production of maximum strength and muscle activity.

We conclude that the use of instability devices in deadlift training does not increase performance, nor does it provide greater activation of the paraspinal muscles, leading us to question their value in the performance of other types of exercises.

However, if the decision is eventually made to use unstable surfaces during parts of the season that do not require high levels of intensity, it is important to know which type of instability element to select, because the capacity to build up strength and muscular activity will depend on degrees of instability caused by the device. Training using materials that cause imbalances on 1 movement axis and reactivity applied to many sport and daily-life surfaces like the T-Bow could have greater intensity than training using materials that cause imbalances in 2 directions and reactivity applied to a few soft surfaces like the Bosu.

References

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Key Words: Deadlift, Instability, T-Bow, Bosu, Electromyography, Strength