INTRODUCTION

Whole body vibration (WBV) training has been the subject of a great amount of debate and research towards improving athletic performance. Whole body vibration is done with the subject standing on a vibrating platform typically with the subject at a slightly flexed position at the knee and hip while the platform oscillates at 20-40 Hz through an amplitude of 1-5 cm (Figure 1).

Figure 1: Positioning used during vibration.

Whole body vibration has been described to produce forces similar to those of power and strength training and has been reported to improve muscular power of the upper and lower musculature, changes to hormonal profile, and increases in cardiovascular responses. (Cochrane, 2004)

Studies have shown over 30% increases in maximal explosive strength, as well as increases in maximum dynamic force, maximum isometric force, and a debatable amount in isometric endurance (Issurin, 2006).

With previous results on acute increases in explosive performance, the purpose of this study was to investigate the effects of short term WBV on sprint starts among collegiate track athletes.

METHODS

Eleven subjects from the Brigham Young University track team were randomly assigned to either a non-vibration or vibration group for testing day number one. Force measurements were taken using a force plate (Kistler 9287BA, Amherst, NY) embedded under the track surface where the starting blocks were placed. Each subject completed three trials with medio-lateral, anterior-posterior, vertical, and resultant forces being measured. Each group did either a non-vibration or a vibration testing day, and then completed the other condition one week later. Participants subjected to vibration were vibrated for 60 s at 26 Hz with an amplitude of 4mm on a Galileo 2000 vibration platform (Orthometrix, White Plains, NY). Following the vibration, approximately two minutes passed before the sprint start. Peak resultant force for non-vibration trials were compared to vibration trials using repeated measures ANOVA.
RESULTS AND DISCUSSION

Peak resultant force was 6% greater when the vibration platform was utilized prior to the start \((p=0.013)\).

One theory behind whole body vibration studies is that, through vibration, the muscle spindle’s sensitivity can be increased. This would occur through vibration induced increases in firing of the alpha sensory and gamma motor neurons resulting in a quicker trained response from the muscle spindle giving a more rapid response to changes in muscle length ultimately ending in a quicker and stiffer (and thus stronger) muscle response. The inhibitory response from the GTO complex is also depressed.

While peak forces were greater in this study for the treatment group, the time of force production must also be considered. Greater peak forces typically result in greater impulses; however, further research with a larger or multiple force plates is required to answer the question of impulse. Impulse could not be measured in this study since the hands did not fit on the force plate. Peak forces were measured correctly here since the hands were off the ground when peak force was attained.

Table 1: Peak resultant force while in contact with the starting blocks \((p=0.013)\).

<table>
<thead>
<tr>
<th>Condition</th>
<th>Peak Force (BW)</th>
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<tbody>
<tr>
<td>Vibration</td>
<td>2.41 ± 0.20</td>
</tr>
<tr>
<td>Control</td>
<td>2.28 ± 0.19</td>
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Another possible benefit of WBV could be a decrease in injury risk. The increase in peak forces following WBV could be due to an increase in muscle spindle fiber sensitivity and stretch-reflex loop sensitivity (Cardinal, 2003). As the muscle spindle and stretch-reflex loop become more sensitive, the muscle could adapt quicker to forces that may cause musculotendon injury. Also, another study found that flexibility in elite female field hockey athletes increased after WVB use (Cochrane, 2005). An increase in flexibility could allow greater range of motion before the muscle would be torn. Therefore, a possible decrease in injury risk could be seen by applying WBV to individuals before competition.

SUMMARY/CONCLUSIONS

Greater forces can be generated in the sprint start following whole body vibration. However, further research is needed to determine whether any meaningful differences in velocity of the start exist. Although greater forces were applied, the practicality of using a platform before competitions needs to be considered. Platform portability may be difficult due to its size, and restrictions at venues may limit their use. Thus, use of the platform in training may be the best application of these findings.

REFERENCES