

Vibration Training and Athletic Performance

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Introduction

The effect of vibration on muscle function has been studied since the 1950's (17). Interest in the effects of vibration on balance (12), cardiovascular function (15) and involuntary muscle reflex responses (19) have also been studied during that time. Whole body vibration (WBV) has been studied in terms of its effect on hormones (18) as well as respiratory responses (16). The possible health benefits and health risks have been of concern with respect to long-term exposure to WBV (8). This includes studies on the effect of WBV on the spine (24) and reproductive organs in females (23). The neuromuscular response of the body to WBV still remains a topic of interest (1, 9). WBV has recently been shown to increase energy expenditure and perceived exertion during exercise (10). This is supported by observed decreases in blood sugar levels with WBV exposure (11). In addition, Norepinephrine (adrenalin) concentrations have been shown to increase as well, however it is unclear as to whether an anabolic hormone response for muscle growth (growth hormone, IGF-I) occurs as a result of utilizing WBV training (6, 11). Muscle activity appears to increase with WBV exposure as shown by several investigations (7, 20). This appears to be the result of activation of a nervous system reflex originating from muscle sensors (14). These mechanisms raise interest as to both the potential acute and chronic influences of WBV on improving athletic performance.

Acute Exposure to WBV

Many studies have shown that acute exposure to WBV results in increased vertical jumping performance (3, 9). Some data also suggests that WBV results in temporary increases in joint range of motion (22, 25). As mentioned previously, WBV has been shown to acutely increase norepinephrine (adrenaline) levels (11) and possibly some anabolic hormones (for muscle growth) such as growth hormone and IGF-I (3). Energy expenditure or metabolic rate, during WBV has been shown to increase as well (10, 13). However, WBV did not yield an increase in muscle oxygenation levels (5). Thus, it appears that acutely WBV provides some level of stimulus that could result in increased athletic performance similar to that of a standard active warm-up procedure.

Training with WBV

Training studies comparing WBV versus general fitness programs have been performed with various results. Bogaerts et al. (2) reported no additional benefits to muscle strength and mass when examining WBV training in comparison to a general fitness program over one year. Adding WBV to squats compared to traditional squats appears to have a minimal additional effect on strength and vertical jump ability as well (21). Another investigation reported similar results when performing either WBV training or a strength and cardiovascular training program (20). Thus, it appears that WBV training may be a viable alternative to normal modes of strength training, but does not have any additional benefit if added to an existing strength training program.

Possible Risks Associated with WBV

WBV has been indicated as a possible risk to the spine and reproductive organs in females and during pregnancy (23). However, most long-term exposure to WBV has been associated with work place environments involving vibration and not WBV platforms used for exercise purposes (4). Conversely a recent study using a WBV platform indicates that exposure to WBV during an exercise workout may exceed recommended WBV exposure (1). However, at this time no long-term studies on the possible risks associated with WBV platform exposure with exercise have been performed.

Conclusion

It appears that WBV may be a viable alternative for increasing athletic performance when used as a warm-up procedure. Data also indicates that WBV training may provide a viable alternative to standard types of strength training. However, adding WBV to an existing strength training program does not appear to be more beneficial than standard types of strength training. Possible health risks associated with long-term exposure to WBV exercise is unclear at this time. However, it appears to be primarily contraindicated in the case of pregnancy.

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