Effect of Whole Body Vibration in Combination with Stretching on Hamstring Force Output and Functional Hop in Individuals, 18-35 Years Old, with a History of Hamstring Strains

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RESEARCH QUESTION

Is the use of whole body vibration (WBV) and stretching versus stretching alone more effective at increasing hamstring force output and functional hop in individuals with a history of hamstring injury?

PURPOSE

This literature review seeks to determine if WBV is an effective modality for improving hamstring force output and functional hop in individuals with a history of hamstring injury.

BACKGROUND

The hamstrings are a group of muscles in the posterior thigh that create extension at the hip joint and flexion at the knee joint. WBV is a modality gaining popularity in fitness facilities and in physical therapy clinics for the purpose of improving a person’s range of motion, force output, decreased tone, increase range, and/or functional ability. WBV uses low frequency vibrations to elicit reflex muscle contractions resulting in neurogenic adaptation. Thus, stimulation increases the level of contraction force of the muscles by acting on the tonic contraction reflex.

ANALYSIS

Athletes who have had hamstring injuries are more likely to sustain a hamstring injury that may lead to decreased ROM, strength, and force output. The results of this literature review suggest that WBV is more effective at increasing hamstring ROM when combined with stretching to increase ROM compared to stretching alone (Figure 1). The research suggests that athletes seeking to increase ROM in their hamstrings over a short period of time may consider using both WBV and stretching to create enhanced neurogenic adaptations. In a given muscle, WBV is an effective modality to increase maximal force output. When applied to elite athletes, acute vibration was seen to have a greater effect (Figure 2). Stretching alone reduces the ability of the muscles to produce a force output. The physiologic effects of WBV may increase ROM and force output in individuals with HS injuries.

LITERATURE REVIEW

Effect of stretching on antagonist muscle activity and muscle force output during single and multiple joint isometric contractions

McBride J, Deane GT, Barnes PG, Verrall GT, and Silva PG

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CONCLUSIONS

Individuals with a history of injury to the posterior leg, low back, or older individuals are at greater risk of suffering a hamstring strain. WBV has been shown to affect the neurophysiological processes in the body in order to elicit muscle contraction reflexes. When the tonic contraction reflex is stimulated an overall increase in the contraction force output of the stimulated muscle may occur. Limited evidence exists to support the claim that WBV will increase force output and enhance functional activity. Limitations in the literature include small sample sizes, lack of participants with hamstring injuries and no combination of WBV with stretching.

FUTURE RESEARCH

Future research should be conducted to examine the effectiveness of WBV in combination with stretching and its effect on functional activities. Additionally, the research needs to evaluate the effectiveness of this modality on individuals who have previous hamstring strain injuries including larger subject samples, recreational and elite athletes, and examination of vibration parameters based on age and gender.

REFERENCES

2. Van Den Tillaar R. Will whole-body vibration training help increase the range of motion of the hamstring? J Strength Cond Res. February 2006; 20:192–196. DOI: 10.1519/JSC.0b013e3180c57b8d

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