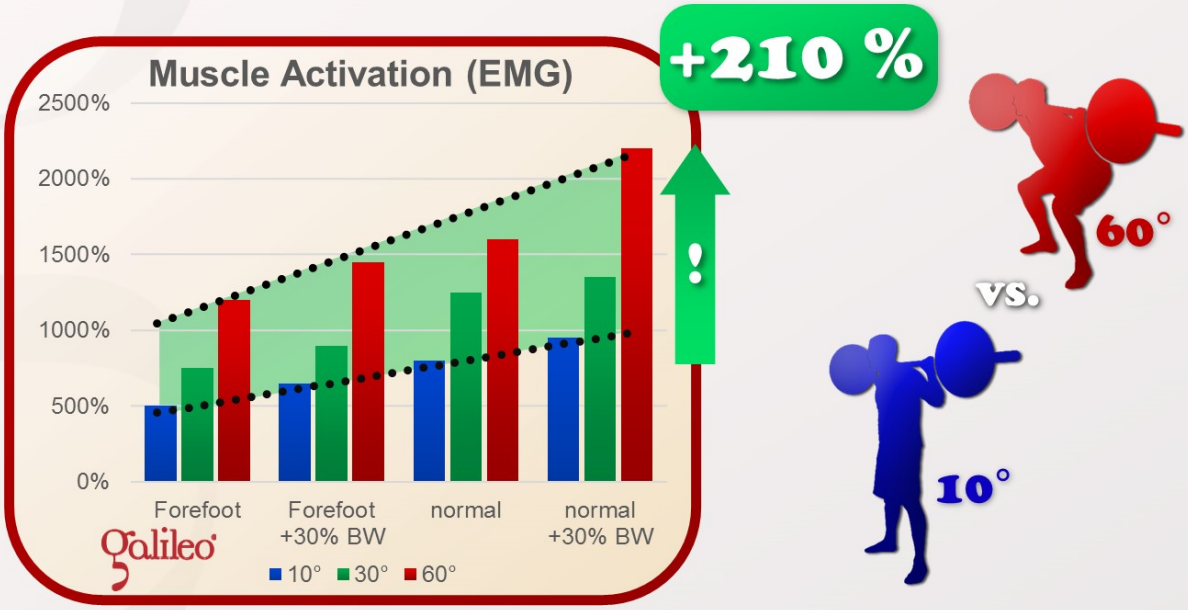
Galileo Training

Does muscle activation increase with knee angle and additional loads ?

The answer is: YES

This study tested the activation (EMG) of the leg muscles at different training frequencies, knee angles and additional loads of 30% body mass. It showed that squats cause significantly higher muscle activation which can be further increased by using additional loads. This way muscle activation can be tripled (+200%).



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The influence of vibration type, frequency, body position and additional load on the neuromuscular activity during whole body vibration.

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Abstract

This study aimed to assess the influence of different whole body vibration (WBV) determinants on the electromyographic (EMG) activity during WBV in order to identify those training conditions that cause highest neuromuscular responses and therefore provide optimal training conditions.

In a randomized cross-over study, the EMG activity of six leg muscles was analyzed in 18 subjects with respect to the following determinants: (1) vibration type (side-alternating vibration (SV) vs. synchronous vibration (SyV), (2) frequency (5-10-15-20-25-30 Hz), (3) knee flexion angle (10 degrees -30 degrees -60 degrees), (4) stance condition (forefoot vs. normal stance) and (5) load variation (no extra load vs. additional load equal to one-third of the body weight).

The results are: (1) neuromuscular activity during SV was enhanced compared to SyV ($P < 0.05$); (2) a progressive increase in frequency caused a progressive increase in EMG activity ($P < 0.05$); (3) the EMG activity was highest for the knee extensors when the knee joint was 60 degrees flexed ($P < 0.05$); (4) for the plantar flexors in the forefoot stance condition ($P < 0.05$); and (5) additional load caused an increase in neuromuscular activation ($P < 0.05$).

In conclusion, large variations of the EMG activation could be observed across conditions.

However, with an appropriate adjustment of specific WBV determinants, high EMG activations and therefore high activation intensities could be achieved in the selected muscles. The combination of high vibration frequencies with additional load on an SV platform led to highest EMG activities. Regarding the body position, a knee flexion of 60 degrees and forefoot stance appear to be beneficial for the knee extensors and the plantar flexors, respectively.