

Effect of vortex wave circulation stimulation on bone measurements of mature horses on stall rest

In today's performance horse industry many owners and trainers use vibration stimulation as a form of therapy for equine athletes. TheraPlate[®] is commonly used to deliver vortex wave circulation (VWC) through front and rear plates that equally distribute pulsatile vibration to all 4 limbs of the horse. This study was aimed to determine the effect of VWC on dorsal cortical thickness (DCT), nutrient foramen thickness (NFT), circumference (NFC), and area (NFA) of the left third metacarpal bone in stall-rested mature, stock-type horses (N = 8). All horses underwent a moderate exercise period for 1 h/d for 4 d/wk for 45-d. During this time, horses had *ad libitum* access to water and were housed on native grass pasture. Following the exercise period, horses were blocked by age, assigned to either control (CON; n = 4) or treatment (TRT; n = 4), and placed on stall rest for 8 wk. During stalling, all horses were fed 2% of BW in hay/d and TRT horses were exposed to 15 min of VWC (50% max; ~2,100 RPM) 2x/d 5 d/wk; whereas CON were not. At the beginning of the stalling period (d 0) and every 2 wk thereafter, radiographs were recorded of the left third metacarpal bone and analyzed for DCT (mm), NFT (mm), NFC (mm), and NFA (mm²). Data were also used to calculate change (%) from d 0. A generalized linear mixed model was used to analyze the data in the GLIMMIX procedure of SAS 9.4 (SAS Institutes, Cary, NC) with significance declared at $P \leq 0.100$. Treatment horses had greater NFT (4.9 vs 2.9 ± 0.4 ; $P = 0.021$) and NFC (16.0 vs 12.0 ± 1.4 ; $P = 0.094$) when compared to CON. A two-way treatment \times time interaction was observed ($P = 0.040$), in which CON and TRT were initially similar (d 0 and 14; $P \geq 0.226$), but TRT horses subsequently had greater NFA on d 28 (19.6 vs 7.6 ± 2.3 ; $P = 0.001$), d 42 (15.1 vs 8.0 ± 2.3 ; $P = 0.038$), and d 56 (16.2 vs 8.0 ± 2.3 ; $P = 0.019$) as compared to CON. Similarly, a two-way treatment \times time interaction ($P = 0.051$) was found for % NFA change, in which NFA of TRT remained the same throughout ($P \geq 0.163$) while CON decreased by 30.0% from d 0 to d 28 ($P = 0.079$), 42 ($P = 0.014$), and 56 ($P = 0.006$). No difference was observed in DCT ($P = 0.248$). An enlargement in the nutrient foramen provides a greater passage for vasculature, which may enhance nutrient blood flow of the distal limb. Therefore, VWC may be a viable therapeutic option for performance horses during stall rest.