

## Effects of Yoga on a Vibration Platform with or without Blood Flow Restriction

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### ABSTRACT

The combination of Yoga with novel modalities like vibration platform and blood flow restriction might exert enhanced physiological responses. **PURPOSE:** To investigate acute effects of yoga performed on a vibration platform (VP) with and without blood flow restriction (BFR) on hemodynamics, flexibility, and lower extremity explosive power. **METHODS:** Total 17 healthy subjects, 8 males (age=  $22 \pm 4.2$  years) and 9 females (age=  $24.2 \pm 2.9$  years), were screened by questionnaires, read and signed informed consent, and participated in the study. Subjects completed 4 separate randomized yoga sessions (on the floor, on the floor with BFR (FL+BFR), on the VP (VP), and on the VP with BFR (VP+BFR)) with at least 48-hr in between. The sessions involving BFR consisted of application of specialized cuffs on the uppermost portion of both thighs restricting blood flow. All sessions started with the measuring of resting heart rate (HR) and blood pressure (BP), followed by a 5-min treadmill warm-up session. Then vertical jump performance (VJ) and flexibility were assessed. The yoga sessions consisted of a series of 8 different yoga poses (Garland pose, Downward dog, Lunge, Chair pose, Twisted chair, Warrior, Squat and Lord of the dance), each lasting 30-sec with 1-min of rest in between poses. During each pose, breathing was monitored by using a metronome to prevent subjects from holding their breath during exercise. VJ and flexibility were again tested immediately post-exercise. HR and BP were also measured immediately after and every 5-min for 25-min following completion of the yoga session. **RESULTS:** Two-way ANOVA showed significant condition main effect ( $p < .05$ ) for flexibility, indicating enhanced flexibility following VP compared to floor ( $p < .05$ ) and VP+BFR ( $p < .05$ ). Significant time main effects were detected for flexibility ( $p < .01$ ), HR ( $p < .01$ ), SBP ( $p < .01$ ) and DBP ( $p < .01$ ) indicating higher post-exercise values. **CONCLUSION:** Enhanced flexibility in response to yoga on VP can be attributed to a vibration-induced activation of Golgi tendon organ causing the related muscle to relax and desensitization of stretch reflex due to activation of muscle spindles by the rapid changes in muscle length. However, no significant improvements in flexibility following the VP+BFR session could be due the placement of BFR cuffs on the uppermost portion of thighs, interfering with vibration-induced muscle length alteration and excitation of Golgi tendon organs.