



# METABOLIC AND CARDIOVASCULAR RESPONSES DURING WHOLE BODY VIBRATION (WBV) EXERCISE: A PILOT STUDY.

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## INTRODUCTION

- Whole body vibration (WBV) is currently being researched for potential therapeutic and sport performance benefits (4).
- Little is known about the psychological and physiological effects of WBV on humans.
- WBV results in increased gravitational loading (g forces) - as a result of stretch reflex activation.
- Previous studies have found WBV load dependent increases in  $VO_2$ , BP, HR and RPE (2,3).
- Increases in blood flow in the popliteal artery using power and colour Doppler (1) and in the calf and foot using cutaneous laser Doppler flow (2) have also been reported.
- No studies have examined the simultaneous effect of WBV on both central and peripheral cardiovascular variables in combination with assessment of psychological stress.

## PURPOSES

- To examine the influence of WBV on peripheral and central cardiovascular responses.
- To examine the influence of graded WBV on metabolic stress (VE,  $VO_2$ , RER).
- To examine the influence of WBV on psychological stress (RPE).



## METHODS

- Six healthy college age females ( $24.2 \pm 3.1$  y;  $165 \pm 3.5$ cm;  $56 \pm 2$  kg).
- Four 3-minute stages of WBV separated by three minutes of rest (Fig 1).
- Increasing vibration challenge was achieved by varying frequency of WBV and foot placement on WBV platform- Galileo 2000.
- Measures of HR, MAP, femoral artery diameter (FAD) and flow (FAF), VE,  $VO_2$ , RER and RPE were taken at the end of each rest and WBV cycle.

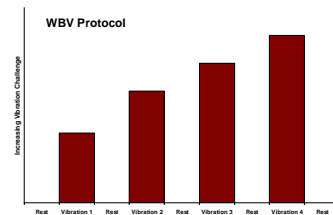


Figure 1: Schematic representation of the testing protocol

## RESULTS

- WBV resulted in increased flow at the highest vibration challenge compared to rest.
- No change in femoral artery diameter.
- HR was higher at final two rest stages compared to first two WBV stages.
- No change in MAP.
- No change in RER or VE but  $VO_2$  approached significance ( $p=0.07$ ).
- Increase in RPE at final vibration challenge with large variability.

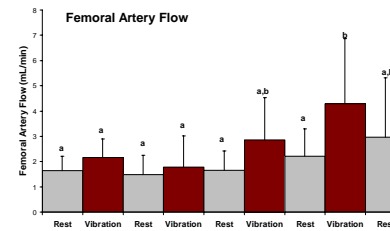


Figure 2: Influence of WBV on Femoral Artery Flow; Letters designate differences from Rest 1 ( $p<0.05$ )

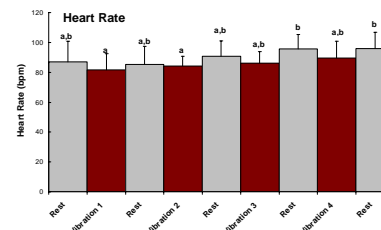


Figure 3: Influence of WBV on Heart Rate; Letters designate differences from Rest 1 ( $p<0.05$ )

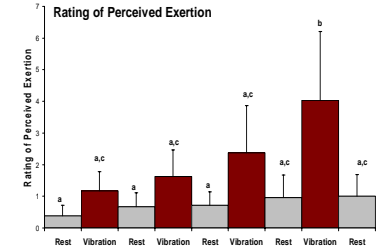


Figure 4: Influence of WBV on Rating of Perceived Exertion; Letters designate differences from Rest 1 ( $p<0.05$ )

## CONCLUSIONS

- Moderate intensity WBV results in increased femoral artery blood flow without a significant change in artery diameter.
- Variability in RPE among participants suggesting wide range of tolerance for WBV and a possible training effect of vibration causing a decrease in perceived exertion.
- Significant small increases in HR and a trend towards  $VO_2$  showing mild physiological strain of WBV at higher loading.
- WBV using this protocol results in mild cardiovascular and metabolic stress, but significant and highly variable psychological stress.
- The psychological stress of WBV exercise may limit individual tolerance to this exercise modality.

## REFERENCES

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