

Correlation of Perceived Stress and Physical Activity Levels on Central vs Brachial Blood Pressures



Mounica Boggala, OMS-III, Pinak S. Patel, OMS-IV, Sean Sullivan, OMS-III, MSH, Alexandra S. Hassan, OMS-III, MBS, Jeffrey Martin, Ph.D, and Lindsey Miller, Ph.D

Introduction

Overview: High blood pressure is a leading risk factor for disability and death worldwide due to the risk of developing cardiovascular disease (CVD).¹ The most routine method of obtaining blood pressure from is via the brachial artery. However, recent studies have shown brachial blood pressure to be less accurate compared to central aortic blood pressure, a better indication of CVD risk.^{2,3}

Importance: Compared to brachial pressure, central aortic pressure is superior due to the vicinity of important organs.⁴ The pressure exerted on these organs is of higher clinical significance. Thus, central systolic pressure has been found to be the most consistent predictor of CVD mortality, deeming it a more accurate marker of blood pressure.⁴

Study Goals: Examining the relationship between central aortic blood pressure and variability of pressure measures with perceived stress and physical activity may lead to new insights into how these lifestyle factors impact blood pressure at different anatomical locations.

Methods

50 university-enrolled young adults were recruited to participate in the study.

After consent, participants height and weight were recorded.

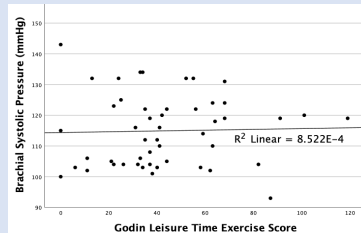
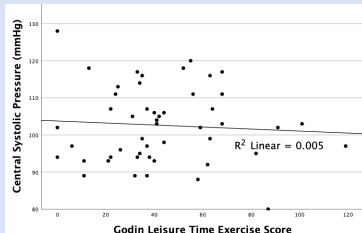
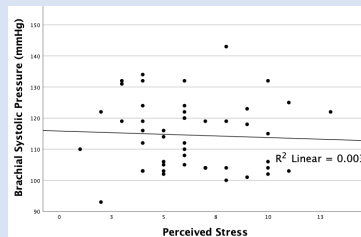
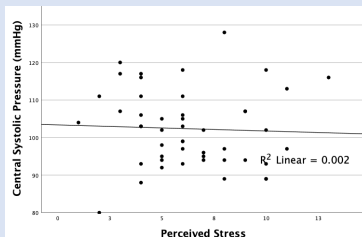
Afterward, the average of 2 measurements of participant's brachial blood pressure was recorded.

Participants were left alone to relax in a quiet room for 10 minutes.

Aortic blood pressure via the radial artery pulse wave analysis was obtained.

Finally, participants completed an exit survey regarding physical activities and perceived stress.

Results



Central systolic pressure was significantly lower (102.24 ± 10.41) than brachial systolic pressure (114.54 ± 11.75). Central diastolic pressure (76.62 ± 7.76) was not significantly different from brachial diastolic pressure (75.68 ± 7.44). There was no correlation between brachial or central systolic pressure when considering perceived stress ($p=0.70$, $p=0.93$, respectively) or physical activity level ($p=0.84$, $p=0.64$, respectively). However, there was a significant relationship between brachial systolic pressure and height ($p<0.05$) as well as brachial systolic pressure and BMI ($p<0.05$). Central systolic pressure was not correlated with height ($p=0.18$) but was correlated with BMI ($p<0.05$).

Conclusions

Central aortic pressure plays a higher integral role than peripheral pressure in the pathophysiology of CVD risk. The results of our study demonstrated strong correlations in consistent reduction of blood pressure when measuring central pressure compared to pressure around the brachial artery in the younger demographic. Perceived stress and physical activities did not correlate with blood pressure changes in this set of participants, as we initially hypothesized. However, we found that the individuals' intrinsic factors, specifically height and BMI, correlated with brachial and central systolic pressure. This is due to several different reasons, some of which are the distance from thorax to periphery adding more pulse wave reflections and abdominal weight adding pressure on central vessels. Further studies need to be performed to understand the effect of more chronic levels of stress and low physical activity levels on both blood pressure measurements. Clinically, we should consider using central pressure measurement as the routine method of blood pressure screening given its direct impact on our heart and vital organs.

References

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