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THE IMPACT OF POSTTRAUMATIC STRESS DISORDER ON PERIPHERAL VASCULAR FUNCTION

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ABSTRACT

The physiological manifestations of posttraumatic stress disorder (PTSD) have been associated with an increase in risk of cardiovascular disease (CVD), independent of negative lifestyle factors. Peripheral vascular dysfunction may be a mechanism by which PTSD increases CVD risk via increases in oxidative stress, inflammation, and/or sympathetic nervous system activity. **PURPOSE:** This study sought to examine peripheral vascular function in those with PTSD compared to age and sex-matched controls. **METHODS:** Eight individuals with PTSD (5 women, 3 men; age 23 ± 2 years), and sixteen healthy controls (CON; 10 women, 6 men, 23 ± 2 years), participated in the study. Leg vascular function was assessed via passive leg movement (PLM) technique and evaluated with Doppler ultrasonography. PLM-induced increases in leg blood flow were quantified as peak change in blood flow from baseline (Δ Peak LBF) and blood flow area under the curve (LBF AUC). **RESULTS:** Significant differences in leg vascular function were revealed between groups. The PTSD group reported significantly lower Δ Peak LBF (PTSD: 294.16 ± 54 ; CON: 595 ± 74 ml·min⁻¹; $p = 0.01$) and LBF AUC (PTSD: 57 ± 24 ; CON: 170 ± 30 ml; $p = 0.02$) when compared to the CON group. **CONCLUSION:** This study revealed that lower limb vascular function is impaired in individuals with PTSD when compared to healthy counterparts.

METHODS

Subjects

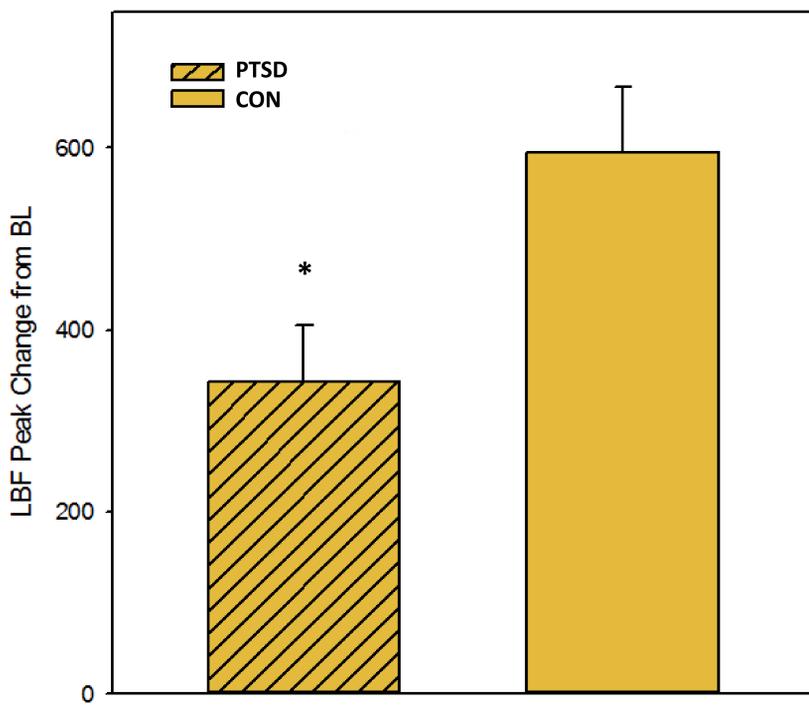
Eight subjects with PTSD (5 female, 3 male) and sixteen subjects without PTSD (10 females, 6 males), free of overt cardiovascular or metabolic disease, participated in this study.

Study Protocols

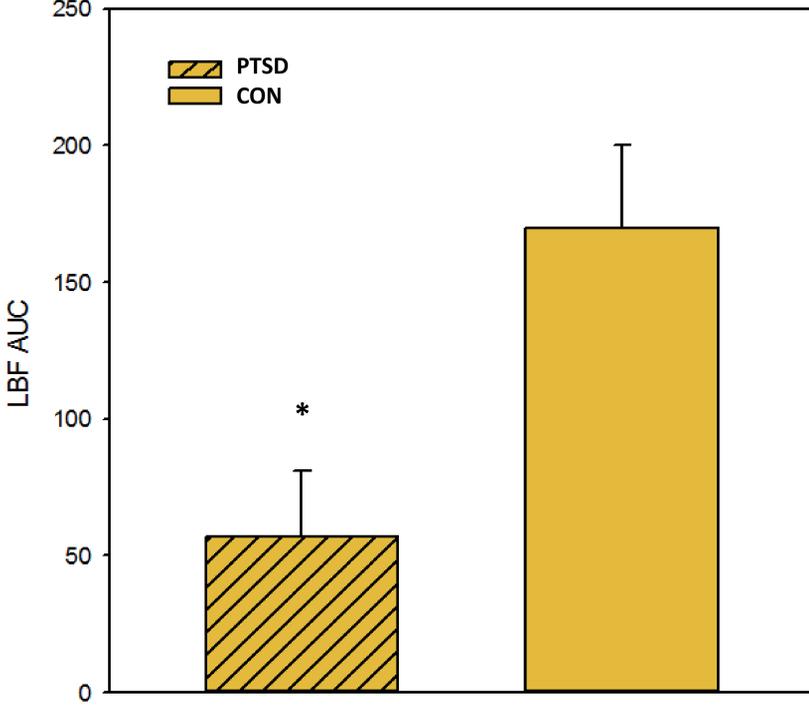
- Lower limb vascular function was assessed using the passive leg movement protocol (PLM) technique. Leg blood flow (LBF) was measured in the common femoral artery of the right leg for one minute prior to and throughout one minute of PLM with a high resolution ultrasound Doppler system (Logic 7, General Electric Medical Systems, Milwaukee, WI).
- Heart rate variability (HRV) was recorded using a 3-lead ECG system (BioPac Systems Inc., Goleta, CA). The low frequency (LF) to high frequency (HF) ratio was analyzed to evaluate the sympathovagal balance.
- A venous blood draw was obtained to assess resting markers of inflammation (interleukin-6, (IL-6) (R&D Systems, Minneapolis, MN) and oxidative stress (malondialdehyde (MDA) (Oxis Research, Foster City, CA).

RESULTS

Change in peak blood flow

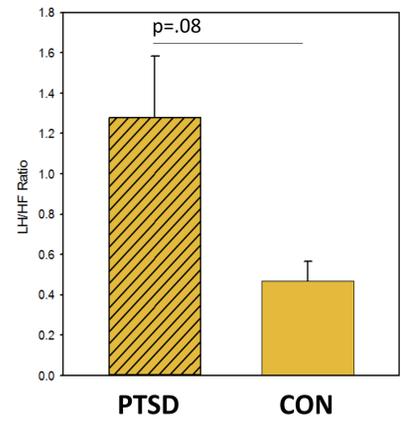


Blood flow area under the curve

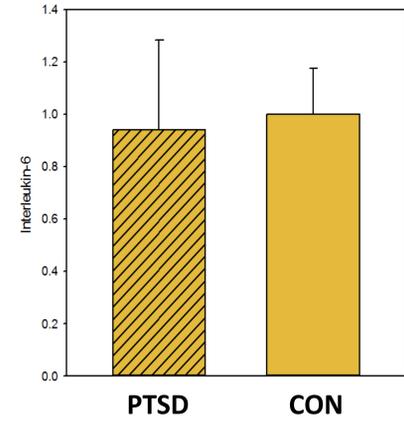


* Denotes significance between groups

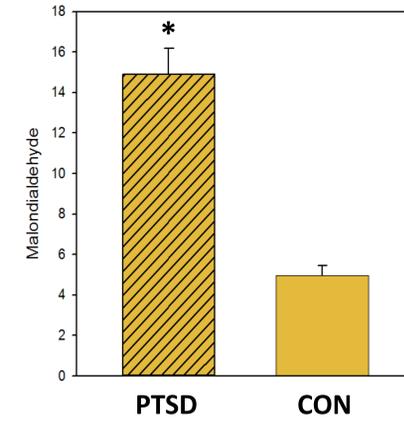
Sympathoexcitation



Inflammation



Oxidative Stress



* Denotes significance between groups

Table 1: Subject Characteristics (Mean \pm SEM)

	CON (n=16)	PTSD (n=8)
Age (years)	23 ± 1	23 ± 2
Height (cm)	169 ± 4	164 ± 4
Weight (kg)	76 ± 4	55 ± 4
Body Mass Index (kg/m ²)	24 ± 1	20 ± 1
Body Fat (%)	23 ± 3	22 ± 3
Thigh Volume (L)	6.4 ± 1	5.1 ± 1

CONCLUSIONS

- The significant difference revealed in both Δ Peak LBF and LBF AUC indicated impaired lower limb vascular function in individuals with PTSD when compared to age and sex-matched controls.
- An increase in oxidative stress, but not sympathoexcitation or inflammation, was reported in individuals with PTSD when compared to age and sex-matched controls.
- This study revealed the negative impact of PTSD on lower limb vascular function.

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