

Xanthine Oxidase Activity is Associated with Dyspnea Severity in Black and African American Patients with Heart Failure

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Background: Of the 6 million Americans affected by heart failure (HF), Black and African American individuals have the highest HF prevalence and mortality rate, yet they are the least likely to receive appropriate care. Structural racism restricts quality and access to care, promotes socioeconomic inequalities, and fosters chronic stress. This not only impacts mental health, but also causes physical damage to the body. Chronic stress increases oxidative stress, which worsens HF by damaging myocardial tissue. The impact of oxidative stress on specific HF symptoms is unknown.

Objective: The purpose of this study is to measure the association of xanthine oxidase (XO) activity, a metabolite and indicator of oxidative stress, and dyspnea, a notable symptom of HF, in an understudied population.

Methods: Self-identified Black and African American adults living with HF (n=31) were enrolled in this cross-sectional study. Xanthine oxidase activity was measured via fluorometric enzyme assay from self-collected dried blood spots obtained by Mitra Microsampling. Dyspnea severity was measured with the PROMIS Dyspnea Severity Short Form 10a. Linear regression analyses were performed using SPSS version 28.

Results: The mean age was 58 ± 12 years and 67% were female. Mean XO activity was 2.69 ± 0.8 mU/mL. Mean dyspnea severity was 48.48 ± 12.3 . XO activity was positively associated with dyspnea severity when controlling for age, gender, and the Charleston Comorbidity Index ($B=2.856$, $p<0.001$).

Conclusions: These findings suggest that higher XO activity is associated with dyspnea severity, indicating a potential target for HF symptom management in Black and African American patients. While further research is needed, pharmaceutical approaches, such as xanthine oxidase inhibitor treatment, could target dyspnea in this population. Additionally, nutrition and activity-based strategies along with community interventions to increase accessibility to these resources should be implemented to reduce the prevalence of heart failure in this population.