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Reduced Urinary Endothelin-1 Levels Are Associated with Elevated Blood Pressure in Young Adults: A Cross-Sectional Study

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Abstract

Urinary biomarkers offer practical and non-invasive advantages for clinical screening, including early cardiovascular risk assessment. While endothelin-1 (ET-1) is a recognised serum biomarker for hypertension, its role in urine, particularly among young adults, has not been fully explored. Therefore, this study aimed to evaluate the association between urinary ET-1 levels and elevated blood pressure (BP) among young adults. In this cross-sectional study, 117 adults aged 18-45 years were recruited: normotensive (n=44; systolic blood pressure (SBP) <120 and diastolic blood pressure (DBP) <80 mmHg), prehypertensive (n=40; SBP 120-139 and/or DBP 80-89 mmHg), and newly diagnosed hypertensive (n=33; SBP ≥140 and/or DBP ≥90 mmHg). Pregnant women, individuals who were receiving antihypertensive therapy, or those diagnosed with underlying renal disease were excluded from the study. Plasma and urinary ET-1 levels were measured via enzyme-linked immunosorbent assay (ELISA). Urinary ET-1 was normalised to urinary creatinine to adjust for hydration status. Creatinine-normalised urinary ET-1 concentrations decreased progressively across the normotensive, prehypertensive, and hypertensive groups; median (25th-75th percentile) 26.39 (22.19-48.82) pg/mmol, 20.61 (14.72-38.55) pg/mmol and 13.49 (9.69-27.27) pg/mmol, respectively (p=0.002). Hypertensive participants exhibited significantly lower normalised urinary ET-1 levels compared to normotensive controls (p=0.001). In contrast, plasma ET-1 levels showed neither

significant intergroup differences nor a significant correlation with urinary ET-1 levels. Reduced urinary ET-1 levels are significantly associated with elevated BP in young adults. However, prospective longitudinal studies are required to establish causality and clarify its mechanistic role in the development of young-onset hypertension.

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Author keywords

Creatinine-normalised Urinary Biomarker; Cross-sectional Study; Hypertension; Prehypertension; Young Adults

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