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Vascular Endothelial Growth Factor as a Biomarker of Early Kidney Microangiopathy in Obese Adolescents with Type 1 Diabetic Nephropathy

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Objectives : Diabetic nephropathy is a leading cause of chronic kidney disease, often progressing due to microvascular damage. Vascular Endothelial Growth Factor (VEGF) plays a crucial role in renal vasculature by regulating endothelial function, while elevated pro-inflammatory markers such as procalcitonin and C-reactive protein (CRP) have been associated with kidney dysfunction. However, the impact of obesity on VEGF-related renal changes remains unclear. This study evaluates VEGF, procalcitonin, and CRP as potential biomarkers of early kidney microangiopathy in obese adolescents with and without type 1 diabetic nephropathy.
Methods : A total of 270 adolescents were included: 110 with type 1 diabetic nephropathy, 80 obese without diabetes, and 80 healthy controls. Serum VEGF, procalcitonin, and CRP levels were measured using ELISA, along with assessments of renal function markers such as serum creatinine, estimated glomerular filtration rate (eGFR), and urinary albumin-to-creatinine ratio (UACR). The association between these biomarkers and kidney function was analyzed in relation to body mass index (BMI) and insulin resistance (HOMA-IR).
Results : Obese adolescents exhibited the highest VEGF levels (366.55 ± 171.44 pg/ml), followed by those with type 1 diabetic nephropathy (259.88 ± 169.89 pg/ml), while healthy controls had the lowest levels (185.75 ± 143.88 pg/ml). Procalcitonin and CRP levels were significantly elevated in adolescents with early signs of kidney dysfunction, correlating positively with BMI, HOMA-IR, and UACR, but not with cholesterol or triglycerides. Statistically significant differences in VEGF levels between the groups suggest its role in kidney microangiopathy.
Conclusions : Elevated VEGF, procalcitonin, and CRP levels are potential biomarkers of early renal microvascular damage, particularly in obese adolescents. The stronger correlation of these markers with obesity than with type 1 diabetic nephropathy highlights obesity's role in accelerating kidney dysfunction. These findings emphasize the need for early monitoring of VEGF and inflammatory markers to prevent progression to chronic kidney disease in at-risk adolescents.