

Angiogenic markers and maternal echocardiographic indices in women with hypertension in pregnancy

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Objective

The maternal cardiovascular system of women with hypertensive disorders of pregnancy (HDP) is impaired, with higher rates of left ventricular (LV) remodelling and diastolic dysfunction compared to normotensive pregnancies. The primary objective of this prospective study was to correlate cardiac indices obtained by transthoracic echocardiography (TTE) and circulating angiogenic markers, such as soluble fms-like tyrosine kinase 1 (sFlt-1) and placental growth factor (PlGF).

Methods

Women with a pregnancy complicated by HDP and a group of uncomplicated pregnancies at term were recruited between February 2019 and August 2021. Women underwent TTE and blood tests to obtain maternal plasma to measure sFlt-1 and PlGF during the peripartum period – within a week of giving birth. LV mass index (LVMI) relative wall thickness (RWT), lateral e' and E/e' were obtained by TTE. Spearman's rank correlation was used to report correlation coefficients between biomarkers and cardiac indices in the HDP population and controls.

Results

95 HDP and 25 normotensive term pregnancies were included. Among HDP patients, there were 61 (64.2%) preeclamptic patients, with 42 (68.9%) delivering preterm <37 weeks. After excluding samples collected following delivery, there was a correlation between sFlt-1 and LVMI ($r=0.246$, $p=0.026$) and E/e' ($r=0.272$, $p=0.014$) in HDP ($n=83$), while in controls sFlt-1 showed a correlation with RWT ($r=0.409$, $p=0.043$), lateral e' ($r=-0.562$, $p=0.004$) and E/e' ($r=0.417$, $p=0.042$). PlGF correlated with LVMI ($r=-0.238$, $p=0.031$) in HDP patients and with lateral e' ($r=0.466$, $p=0.022$) in controls. sFlt-1/PlGF ratio correlated with lateral e' ($r=-0.568$, $p=0.004$) and E/e' ($r=0.428$, $p=0.037$) in controls and with LVMI ($r=0.252$, $p=0.022$) and E/e' ($r=0.269$, $p=0.014$) in HDP. Considering only women with HDP, sFlt-1 was higher when LVMI was ≥ 95 g/m² and RWT was ≥ 0.42 during pregnancy. In the entire cohort, sFlt-1, as well as sFlt-1/PlGF values, increased, and PlGF decreased with LV remodelling severity.

Conclusion

Significant correlations were detected between circulating angiogenic markers and cardiac parameters of LV remodelling and diastolic function indices in normotensive and hypertensive pregnancies. Although the current data are not able to infer causality, they confirm the intimate relationship between the maternal cardiovascular system and endothelial markers that are used both to diagnose and indicate the severity of HDP.