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Absence of midterm renal hyperfiltration imposes the adverse pregnancy outcome

Sehoon Park*[1], Joon Seok Hong[2], Jongshin Park[3], Ho Jun Chin[4], Ki Young Na[4], Dong Ki Kim[1], Kown Wook Joo[1], Yon Su Kim[1], Hajeong Lee[1]

[1]Department of internal medicine, Seoul national university hospital, Seoul, [2]Department of gynecology and obstetrics, Seoul national university bundang hospital, Gyeonggi-do , [3]Department of gynecology and obstetrics, Seoul national university hospital, Seoul, [4]Department of internal medicine, Seoul national university bundang hospital, Gyeonggi-do, Korea, Republic Of

Background: Although renal hyperfiltration (RHF) was considered to be normal adaptation process during gestational period, the clinical impact of RHF during pregnancy remains obscure.

Methods: This study included pregnancy cases in two tertiary teaching hospitals in Korea from 2001 to 2015. We used CKD-EPI eGFR (estimated glomerular filtration rate) in second trimester of each pregnancy to assess mid-term RHF of mothers. Mothers were divided into four groups as follows: eGFR 60-90, 90-120, 120-150, and ≥150 ml/min/1.73m^2. Mothers with high risk age (≥40 years or <19 years) and eGFR<60 mL/min/1.73 m^2 before or during pregnancy were excluded. Adverse pregnancy outcome was composition of preterm birth, low birth weight and preeclampsia. Subgroup analysis was done with mothers with known baseline renal function.

Results: A total of 2,424 mothers were included in the study. Median age was 32 (30-35) years and median mid-term eGFR was 129.7 (118.9-136.8) ml/min/1.73m^2. Mothers with the highest and the lowest mid-term renal function were relatively younger than middle two eGFR groups. Interestingly however, they developed more preterm birth, low birth weight, and preeclampsia during pregnancies, compared with middle two eGFR groups. Overall, midterm eGFR showed non-linear U-shape association with the adverse pregnancy outcome. This tendency was also proved in univariate and multivariate analysis. Compared with mothers with eGFR 120-150 mL/min/1.73 m^2, those with eGFR 60-90 (adjusted OR 2.897, 1.054-7.966, P=0.039), eGFR 90-120 (adjusted OR 1.328, 1.026-1.718, P=0.031), and even mothers with eGFR≥150 mL/min/1.73 m^2 showed increased risk of adverse pregnancy outcome (adjusted OR 1.909, 1.144-3.187, P=0.013). Sensitivity analyses in pregnancy cases with gestational age equal to or more than 28 weeks also showed similar results. In subgroup analysis, absence of midterm RHF was a significant risk factor for adverse pregnancy outcomes especially in mothers without pre-gestational CKD evidence. U-shaped relationship between midterm eGFR and risk of adverse pregnancy outcome was also shown in this subgroup.

Conclusion: In this study, we demonstrated a novel, non-linear, U-shaped relationship between midterm eGFR and the risk of adverse pregnancy outcome. Absence of midterm RHF was a significant risk factor of worse pregnancy prognosis. Therefore it can be used as an early marker to predict adverse pregnancy outcomes.

Table:

Keywords: hyperfiltration, low birth weight, preeclampsia, Pregnancy, preterm birth