

A Study Of Maternal and Fetal Outcomes in a Cohort of Pregnant Women with Chronic Kidney Disease

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Introduction:

Chronic Kidney disease (CKD) is estimated to affect 6% of women of child bearing age and 3% of pregnant women. Pregnancies in women with CKD are associated with increased risk of fetal and maternal complications compared to the general population. However, there are conflicting data on the impact of CKD on pregnancy outcome, and limited data on the effect of hypertension and proteinuria. The aim of this study was to report comprehensive pregnancy outcomes in a heterogeneous, closely serially monitored cohort of pregnant women with CKD.

Methods:

Women with CKD were recruited from a tertiary renal-obstetric antenatal clinic in Birmingham, UK (between 2011 and 2016). Baseline demographic, serial clinical information and pregnancy outcomes were recorded, and compared by CKD stage. A composite adverse outcome was defined as any of the following: miscarriage, delivery < 34 weeks, intrauterine growth restriction, intrauterine death (IUD)/still birth, birthweight <1500 grams(g), neonatal unit admission or neonatal death.

Results:

We studied 167 pregnancies (138 women), with a mean age at conception of 31 ± 6 years, with the majority of White (61%) or South Asian (24%) ethnicity. The distribution of pre-pregnancy CKD staging was 38% stage 1, 36% stage 2, and 26% in the combined stage 3-4, Median pre-pregnancy serum creatinine was $84 \mu\text{mol/l}$ (IQR; 62-110) and urine ACR 7.6 mg/mmol (1.7-48.6). The causes of CKD were: glomerulonephritis (29%), tubulointerstitial disease (19%), structural (15%), lupus nephritis (12%), polycystic kidney disease (12%) and others (12%).

Patient demographics were generally similar across the CKD stages, except for an increasing prevalence of renal transplants ($p=0.003$) and chronic hypertension ($p<0.001$) with CKD stage. Gestation at delivery declined with increasing CKD stage (median 38.0 vs. 35.8 for stage 1 vs. 3-4, $p<0.001$), with a corresponding decline in the median birthweight (2918 vs. 2560g, $p<0.001$). Emergency caesarean sections were required in 25% vs. 60% of CKD stage 1 vs. 3-4 pregnancies ($p=0.010$), with median post-delivery hospital stay increasing from 2 to 5 days ($p<0.001$). Preeclampsia was diagnosed in 23% of pregnancies (7% before 34 weeks), with rates increasing from 17% to 45% for CKD stage 1 vs 3-4 ($p=0.009$, Figure 1). Post-hoc analyses found all of these outcomes to be similar in CKD stages 1 and 2, but significantly worse in stage 3-4.

The composite adverse outcome occurred in 30% of pregnancies; there were no IUD/still births, but three first trimester miscarriages, and three neonatal deaths. Composite adverse outcome rates were similar in CKD stages 1 and 2 (both 22%, $p=1.000$), but significantly higher in CKD stage 3-4 (50%, $p=0.012$).

Multivariable analysis found chronic hypertension (OR: 9.5, $p<0.001$) and previous still birth (OR: 61.5, $p=0.005$) to be independent predictors of the composite outcome. A difference across aetiologies was also detected ($p=0.006$), with the highest rate in lupus nephritis. After accounting for these factors, CKD stage was not found to be a significant independent predictor of adverse outcome ($p=0.290$).

Conclusion:

Pregnancy outcomes in a contemporaneous cohort are similar for CKD stages 1 and 2, but adverse outcome rates for women with CKD stages 3-4 are increased by comparison.