

End-Stage Kidney Disease and Dialysis in Pregnancy: Maternal and Fetal Outcomes

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Abstract

Original Research Article

Introduction: The decline in kidney function disrupts reproductive physiology, a condition that dialysis, despite improving survival in end-stage kidney disease (ESKD), cannot fully correct. As a result, pregnancies in this population are both uncommon and high-risk. **Aims:** We reported our center experience about pregnancy management in patients on hemodialysis: dealing with hypertension, ultrafiltration rate, dose dialysis in order to improve maternal and fetal outcome. **Methods:** We reported pregnancy outcomes of 12 cases recorded in the Tensift Region between March 2015 and July 2023. Maternal outcomes included preterm delivery, delivery by cesarean section, preeclampsia/eclampsia, length of stay at hospital (>3 days), and maternal death. Fetal outcomes included low birth weight (less than 2,500 g), small-for-gestational-age, admission to the neonatal intensive care unit, and infant mortality. **Results:** We reported 11 pregnant women cases on hemodialysis. Mean age of our patients was 27,8 ($\pm 4,82$) years. It was the first pregnancy for 4 patients (33,33%). The mean duration of pregnancy was 34,65($\pm 4,66$) weeks and mean fetal weight was 1,825($\pm 0,57$) kg. All patients were dialyzed over 20 hours per week, except for one who was unaware of the pregnancy and therefore dialyzed for only 12 hours per week for 24SA. The median urea value was 0,425 g/L. Four patients developed preeclampsia and needed anti-hypertensive drugs (33,33%). The overall live birth rate of our cohort was 75,7%. In our cohort we reported two fetal deaths at 21 SA and 26 SA explained by tocolysis failure for preterm labor and one neonatal death at D-3 post partum due to fetal growth restriction secondary to elevated urea levels. 4 newborns were admitted to the neonatal intensive care unit (NICU). **Conclusion:** While pregnancies in individuals on dialysis carry higher rates of adverse outcomes, Intensive, prolonged daily dialysis regimens are associated with improved maternal and fetal outcomes.

Keywords: fetal outcomes, Maternal outcomes, Hemodialysis, Chronic renal failure, Pregnancy, End stage renal disease.

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INTRODUCTION

As chronic kidney disease (CKD) advances, pregnancy becomes increasingly difficult for young women due to hormonal imbalances and reduced fertility. The decline in kidney function disrupts reproductive physiology, a condition that dialysis, despite improving survival in end-stage kidney disease (ESKD), cannot fully correct. Most female dialysis patients experience menstrual irregularities, with amenorrhea being prevalent and anovulatory cycles—where ovulation ceases—common among those who continue menstruating. These reproductive challenges significantly reduce fertility, making conception rare. As a result, pregnancies in this population are both uncommon and high-risk, further exacerbated by dialysis's inability to restore normal physiological function. When pregnancy does occur, the elevated risk

of maternal and fetal complications necessitates comprehensive, multidisciplinary medical management to improve outcomes.

Aims:

We reported our center experience about pregnancy management in patients on hemodialysis: dealing with hypertension, ultrafiltration rate, dose dialysis in order to improve maternal and fetal outcome.

METHODS

We reported pregnancy outcomes of 12 cases recorded in the Tensift Region between March 2015 and July 2023. Maternal outcomes included preterm delivery, delivery by cesarean section, preeclampsia/eclampsia, length of stay at hospital (>3 days), and maternal death. Fetal outcomes included low birth weight (less than

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2,500 g), small-for-gestational-age, admission to the neonatal intensive care unit, and infant mortality.

RESULTS

We reported 11 pregnant women cases on hemodialysis. Mean age of our patients was 27,8 (\pm 4,82) years. It was the first pregnancy for 4 patients (33,33%). In about half of patients dialysis was initiated during their pregnancy. The mean duration of pregnancy was 34,65(\pm 4,66) weeks and mean fetal weight was 1,825(\pm 0,57)kg.

All patients were dialyzed over 20 hours per week, except for one who was unaware of the pregnancy and therefore dialyzed for only 12 hours per week for 24SA.

The median urea value was 0,425 g/L. Four patients developed preeclampsia and needed anti-hypertensive drugs (33,33%) mainly nicardipine. The overall live birth rate of our cohort was 75,7%.

In our series the delivery was mainly vaginal, only two c-sections were performed in our cohort we reported two fetal deaths at 21 SA and 26 SA explained by tocolysis failure for preterm labor and one neonatal death at D-3 post partum due to fetal growth restriction secondary to elevated urea levels. 4 newborns were admitted to the neonatal intensive care unit (NICU).

At 9 months all children had good cognitive and psychomotor involvement.

DISCUSSION

In 1971, Italy reported the first successful pregnancy in a patient undergoing dialysis. The woman had been on hemodialysis for three years, receiving 24 hours of treatment per week, and gave birth to a full-term infant weighing 1950 grams [1].

However, early case series revealed low conception rates, a small number of viable births, and a high prevalence of maternal and fetal complications [2, 3].

A major shift in the clinical approach to pregnancy in dialysis patients emerged in the early 2000s, as growing evidence supported its feasibility [4, 5]. At the core of this progress was the recognition of a strong correlation between dialysis intensity—both frequency and duration—and pregnancy outcomes. This realization led to the adoption of more intensive dialysis regimens, often involving daily and prolonged sessions. These protocols have significantly improved maternal and fetal health, making pregnancy a more achievable and safer possibility for women with end-stage kidney disease (ESKD) [5, 6].

Although a definitive optimal dialysis prescription remains elusive, emerging practices—particularly from Canadian experience—are starting to take shape. For patients without residual renal function, it is recommended to schedule at least 36 hours of dialysis per week, ideally on a daily basis. Additionally, weight loss during dialysis should occur very gradually, with efforts made to avoid hypotension and to refrain from overly aggressive correction of hypertension. Lower blood and dialysate flow rates are preferred to provide a gentler dialysis experience. Finally, rather than relying solely on Kt/V as a measure of dialysis efficiency, the target should be to achieve predialysis urea levels that are nearly normal (measured after the day break) [7-9].

To date, the most favorable pregnancy outcomes in women with ESRD have been achieved in centers that use intensive hemodialysis—typically defined as averaging more than 24 hours per week. For instance, two reports from a German dialysis center detailed five pregnancies with notably positive results [10, 11] and a report from a home hemodialysis center in Toronto described a 100% live birth rate in six pregnancies managed with intensive HD [12].

The mean maternal age was 33 years in the German cohort and 28 years in the Canadian cohort, which is consistent with the findings of our study.

In the German center, the five women delivered live infants at an average gestational age of 32 weeks, with a mean birth weight of 1765 \pm 554 g. On the other side, the infants from the Canadian study were born at a mean gestational age of 36.2 \pm 3 weeks—with only one infant delivered before 36 weeks—and had a mean birth weight of 2417.5 \pm 657 g [12].

In the latter cohort, both gestational age and birth weight were higher than those observed in our study and those reported by the German center.

Our predialysis urea levels were higher than those of the German and Canadian cohorts by 36 \pm 14 mg/dL and 22.4 \pm 11.2 mg/dL, respectively [10, 11].

Given the heightened risk of preeclampsia and eclampsia in individuals with chronic kidney disease (CKD) and hypertension, optimizing blood pressure control through intensive hemodialysis (HD) may improve both maternal and fetal outcomes during pregnancy. Additionally, studies utilizing national administrative datasets from multiple countries have highlighted significant variability in reported live birth rates [13].

Research using national administrative datasets across multiple countries has demonstrated considerable variability in reported live birth rates.

Data from ANZDATA indicate a 79% live birth rate among women with end-stage kidney disease (ESKD) between 1966 and 2008, consistent with our study's results [14]. In contrast, Shah *et al.*, [15], analyzing the U.S. Renal Data System (USRDS), documented a significantly lower live birth rate of 27.1% in the U.S. cohort. Notably, even in intensively dialyzed populations with high live birth rates, approximately 70% of infants required neonatal intensive care unit (NICU) admission [16]. However, the incidence of fetal malformations in the ESKD population does not differ significantly from that observed in the general population [8].

CONCLUSION

In summary, while pregnancies in individuals on dialysis carry significant risks and higher rates of adverse outcomes, patients should be informed that conception and successful pregnancies are achievable under optimal conditions. Intensive, prolonged daily dialysis regimens are associated with improved maternal and fetal outcomes, making them the preferred approach. To ensure safety and success, multidisciplinary collaboration—particularly with obstetric specialists—is strongly recommended throughout the pregnancy journey.

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