DIALYSIS IN PREGNANCY

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PREGNANCY IN CHRONIC KIDNEY DISEASE AND DIALYSIS PATIENTS

The first section of this newsletter will focus on pregnancy outcomes in hemodialysis (HD) and peritoneal dialysis (PD) patients, as well as the occurrence of acute kidney injury (AKI) during pregnancy.

CONSIDERATIONS FOR DIALYSIS IN PREGNANT WOMEN

The second section will highlight some factors to consider for managing pregnant dialysis patients as well as the modality of kidney replacement therapies (KRT), and optimization of modifiable risks prior to pregnancy.

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Pregnancy in CKD patients

Chronic Kidney Disease (CKD) is an advanced condition affecting more than 10% of the global population, equivalent to about 800 million people (1). Although CKD and end-stage kidney disease (ESKD) are somewhat prevalent disorders, pregnancy is uncommon in ESKD patients due to lower fertility rates and multiple adverse effects in pregnant women on dialysis (2). Irregular menstrual cycles are common in around 70% of women on dialysis and 84% of ESKD women have been reported to have low libido which attributes to lower conception rates and fertility in these women (2).

Several studies have indicated pregnancy-related outcomes in dialysis patients. The most common modalities for pregnant women with ESKD are HD and PD. In the Australian and New Zealand Dialysis and Transplantation Registry (ANZDATA) analysis with 23,700 person-years of observational data, pregnancy rates were higher in HD over PD patients (P<0.02) (3). Similar observations were made in a US retrospective analysis with 2352 pregnant women on dialysis, for a rate of 17.8 Per thousand Patient Years (PTPY), [Hazard ratio (HR)=0.47, 95% CI=0.41-0.55] (4) (Figure 1a). These studies suggest that the pregnancy rate is lower in PD patients than in those on HD. However, there are both pros and cons to using any of these modalities during pregnancy (Table 1) (5).

Additionally, the timing of dialysis also affects the pregnancy outcomes. Pregnancies before initiating dialysis or in the first year of dialysis may achieve a favorable term than those after a long period of dialysis (4,5,6). An ANZDATA registry analysis (n=77), showed that live birth rates were 91% in women who conceived before starting dialysis compared to 63% in those who conceived during dialysis (P=0.03). This was mainly attributed to higher miscarriages in dialysis patients (7). The ANZDATA analysis (3) also indicated that women on dialysis had less live birth rates than those with transplantation and general healthy population (3) (Figure 1b). Furthermore, another ANZDATA analysis indicated higher chances of pregnancy post one year of transplantation (8).

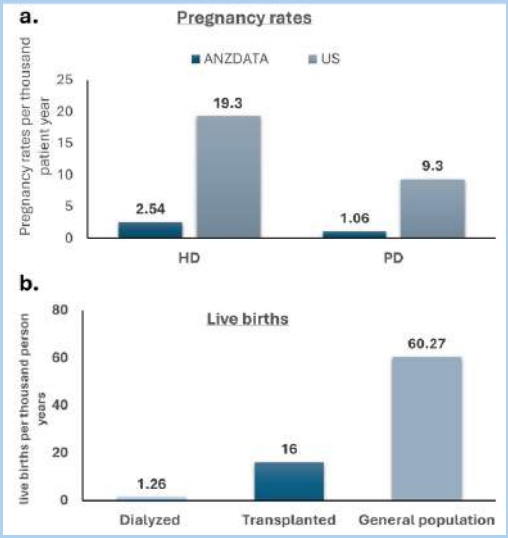

Figure 1: a. Pregnancy rates for women on HD vs PD in ANZDATA (P<0.02) and US (P=0.03) data (3,4). b. Live birth rates in dialyzed vs transplanted and general population ANZDATA (3).

Pregnancy induced AKI

Pregnancy induced AKI has been increasing over last few years, probably due to higher maternal age. In a US study with more than 42 million pregnancy related hospitalization, the AKI rate increased from 0.04% (2006) to 0.12% (2015) (9). Some causes of AKI in pregnancy include preeclampsia, septic abortion, hypertension, hemorrhage, acute fatty liver, and glomerulonephritis (10,11). A meta analysis comparing pregnant women with and without AKI, showed higher maternal death (HR =4.5; P<0.001) and fetal deaths (HR =2.57; P<0.001) in the AKI group (12). There is no distinct criteria for AKI diagnosis in pregnancy and its assessment should start with review of patient's history, other comorbidities and underlying cause of kidney injury. Ultimately, management of these patients need a multidisciplinary approach with timely dialysis initiation and prompt delivery, if needed (11).

	Pros	Cons
Hemodialysis (HD)	• Less dietary and water restrictions • Reduced risk of infections • Less overload using the technique	• Worse metabolic control (intermittent dialysis) • Higher risk of hemodynamic instability • Need of anti-coagulation • Less autonomy
Peritoneal dialysis (PD)	• Lower risk of hemodynamic instability • Higher degree of autonomy • No need for anticoagulation • Preserving residual kidney function • Better metabolic control	• Higher risk of infectious complications • More difficulty managing volume • Higher chance of intrauterine growth restriction • Increase in the frequency of exchanges as volume increase is not tolerated • Hypertonic dialysate can impair normal ovulation (2) • Metaplasia and ovarian/ fallopian tube fibrosis may induce a mechanical barrier to ovulation (2)

Table 1: Pros and cons of HD and PD during pregnancy (2, 5).

CONSIDERATIONS FOR DIALYSIS IN PREGNANT WOMEN

Over the years, the advancement in dialysis, maternal and neonatal care as well as treatment has led to improvement in the prognosis of pregnant women with ESKD. These women have a higher risk for maternal and fetal complications such as pre-term births, spontaneous miscarriage, stillbirths, polyhydramnios, preeclampsia, Small for Gestational Age (SGA), and respiratory distress syndrome (4,5). Due to the complexity of pregnancy with kidney disease, there are no specific guidelines on managing pregnant women in the Kidney Disease Outcomes Quality Initiative (KDOQI) or National Institute of Health and Care Excellence (NICE) (13). Therefore, it is crucial to have a multidisciplinary approach in attending physicians (5). Some recommendations from UK Consensus group (13) and other clinical considerations have been summarized in table 2.

Hemodialysis (5,15)	Peritoneal dialysis (14,15)	Urea levels (13)
• **HD intensity may be increased to ≥ 36 hours/week** according to the BUN levels, RKF, and complications (5) • **Nocturnal HD** can be an option (15) • **Appropriate dry weight estimation** especially in 2nd and 3rd trimester (Usually 300-500 g weekly increase) (5) • Appropriate anticoagulants (As minimal as possible) (5)	• **Reduce dwell volumes** at each cycle and Increase the number of cycles (14) • APD may be considered in addition to CAPD (15) • Monitor signs of infections (peritonitis) (14) • Monitor polyhydramnios and small for gestational age (SGA) (14) • Avoid aggressive PD regime for polyhydramnios (14)	• Keep pre-dialysis Blood Urea Nitrogen (BUN) below 12.5 mmol/L for pregnant women on HD • Dialysis can be initiated in AKI pregnant patients when the maternal urea concentration is 17-20 mmol/L
Dialysis modality (13,14,15)	**Nutrition (5)**	**Multidisciplinary approach (14)**
• UK consensus group recommends PD patients before pregnancy, to **switch to HD** during pregnancy (13) • According to the Italian Study group, dialysis may be continued in the **same mode as before pregnancy if there are no contraindications** (15) • **Personalize the treatment** according to the patient's preferences, available modality, and expected efficiency for that individual (14)	• Use of Vitamin D and folate supplements • Erythropoietin (EPO) and iron supplementation to keep Hb over 10 g/dL • **Daily protein uptake of 1.8 g**/pre-pregnancy weight +10-20 g • **Daily caloric uptake of 35 kcal**/pre-pregnancy weight + 300 Kcal	Nephrologists, Obstetricians, neonatal care specialists, Dietitians, and Renal Nurses are suggested to be involved in managing these patients due to the working complexity of treatment.

Table 2: Considerations to manage pregnant dialysis patients (5,13-15). RKF: Residual kidney function; APD: automated peritoneal dialysis; CAPD: Continuous ambulatory peritoneal dialysis; EPO: erythropoietin.

Apart from these, there are some pre-pregnancy modifiable risks that could be considered for better outcomes in pregnant women on dialysis, such as avoiding hypoglycemic episodes, maintaining a normal body mass index (BMI), targeting blood pressure below 140/90 mmHg and avoiding smoking (14). It is also suggested that all dialysis patients with pregnancy or planning one, should undergo counselling on fertility, contraception and reproduction (15). In addition, post-partum care is essential along with social and emotional support. Pre-pregnancy HD regimen can resume immediately after vaginal delivery and women desiring to breastfeed, should be more careful with the medications (2).

Hence, with the advancements in dialysis technology, quality of supplies and methods, growing pharmaceutical access and knowledge, and more awareness of the dietary requirements and quality of life of the patients, the pregnancies in dialysis patients can be successful (5). Although long-term studies on the effects of dialyzing mothers on newborns are limited, they would contribute to an increasing corpus of research that may be used to counsel these patients. Additionally, well-established guidelines based on current data would be beneficial for better management of pregnant patients on dialysis (14).

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