CHIEF SCIENTIST OFFICE

CODE:PCL/18/03

RESEARCH PROJECT BRIEFING

Reproductive Factors and Future Risk of Kidney Disease

AIMS

To use the UK Biobank database to explore the influence of reproductive factors on risk of future kidney disease. To answer what (if any) effect the number of children someone has had has on their future risk of chronic kidney disease (CKD) or kidney failure. To determine if the age at which someone has children impacts upon their future risk of CKD or kidney failure.

KEY FINDINGS

- Compared with women with no children, women who had 2 or 3 live births had a reduced risk of CKD, but no change in their risk of kidney failure.
- There was no association between number of children fathered and presence of CKD at entry to UK Biobank.
- In both women and men, a later age at first birth is associated with a reduced risk of CKD, but no altered risk of future kidney failure.

WHAT DID THE STUDY INVOLVE?

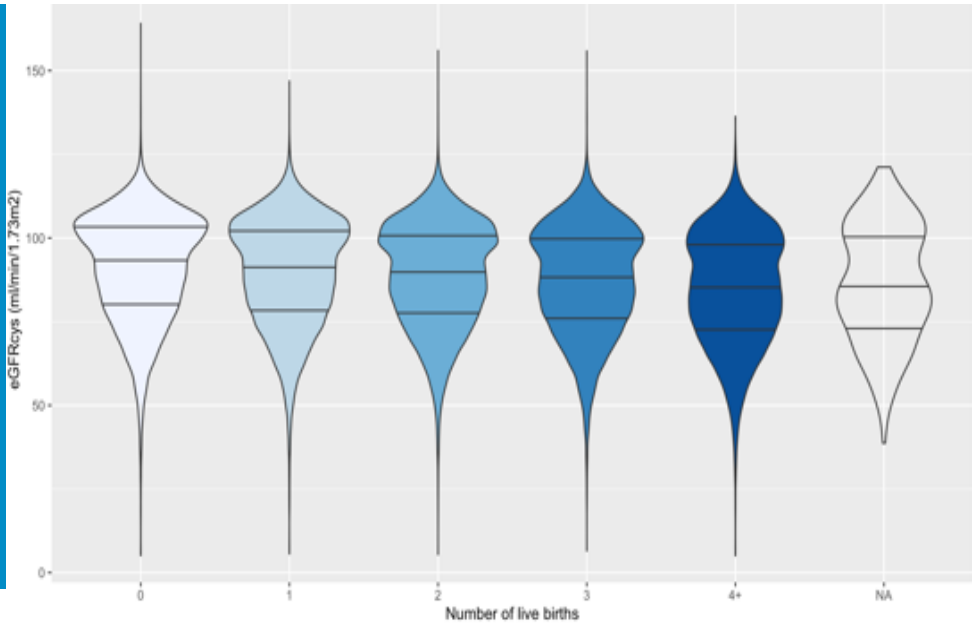
Between 2007 and 2010, the UK Biobank recruited over 500,000 participants aged 37-73. Participants gave a detailed reproductive history and had extensive phenotyping and sampling of baseline biochemical measures including kidney function and albuminuria. Using cox regression models, I yielded adjusted hazard ratios for the presence or absence of CKD at entry to UK Biobank for: number of births and age at first birth. A survival analysis to assess for differing risk of development of kidney failure after entry to UK Biobank was performed to look at whether number of births or age at first birth altered a women's risk of kidney failure.

WHAT WERE THE RESULTS AND WHAT DO THEY MEAN?

We included 254,032 women with available biochemistry and reproductive history at UK Biobank entry. 54,685 (21.5%) women had CKD1-5. Women with CKD were older than those without CKD , had a greater BMI and had a higher blood pressure . Women with CKD had a higher mean number of live births (1.9±1.2 v 1.7±1.2) and were younger at first live birth (24.5±4.6 v 26.0±4.9 years). On Cox regression, and after adjustment for age, socio-economic status, BMI, smoking, systolic blood pressure and presence of diabetes, hazards ratios showed that compared with 0 births, 2 or 3 live births was protective against CKD1-5 (1 birth: HR 0.99 (0.95-1.02, p=0.469, 2 births: HR 0.86 (0.81-0.92, p<0.001, 3 births: 0.88 HR 0.82 – 0.92, p<0.001) (Figure). Later age at first birth was associated with a reduced HR of CKD: HR 0.99 (0.98-0.99, p<0.001).

To our knowledge this is the first time that age at first birth and number of children have been shown to alter risk of future CKD.

Figure: Violin plot of estimated glomerular filtration rate measured by cystatin c, the x-axis shows number of live births in women, the lines on each violin represent population quartiles



WHAT IMPACT COULD THE FINDINGS HAVE?

Data generated from this project has led to proposals to further investigate lifestyle factors and their influence of future risk of kidney disease. Our research group will now use UK Biobank data to look at the possible impact of raising children on a person's lifestyle. We will explore gender differences in the context of reproductive history and risk of CKD in greater detail. We will look at the influence of diet, environment, exercise and healthy lifestyle on risk of CKD progression. Additionally, we are using the SAIL database to look at multi-morbidity and lifestyle factors and their association with CKD. These exploratory studies may influence future lifestyle advice given to the general population and those with and without CKD.

HOW WILL THE OUTCOMES BE DISSEMINATED?

I have submitted these results to the Scottish Renal Association annual meeting and plan to additionally submit the results to the European Renal Association international meeting. I will submit these results to a peer reviewed journal for publication and will share the results on social media in due course.

CONCLUSION

The number of children a woman has, and the age at which either a man or woman has children appears to influence future risk of chronic kidney disease, the reasons for this are unclear at present and warrant further exploration.

RESEARCH TEAM & CONTACT

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Additional Information

Project completed August 2021, funding £20,800.