

Preterm birth and long term maternal renal disease: A Systematic Review and Meta-Analysis

Emily Stocks¹, Maryam Abdelkarim ^{2, 3}, Megan Holness ¹, Joshua Odendaal ^{2, 3}

¹ Warwick Medical School, University of Warwick, Coventry CV2 2DX, United Kingdom

² Division of Biomedical Sciences, Clinical Sciences Research Laboratories, Warwick Medical School, University of Warwick, Coventry CV2 2DX, United Kingdom.

³ University Hospitals Coventry & Warwickshire, Coventry CV2 2DX, United Kingdom.



BACKGROUND

- Preterm birth is defined by delivery before 37 weeks gestation ⁽¹⁾
- It occurs in 8% of babies born in the UK ⁽¹⁾
- Preterm birth can result in detrimental outcomes for both the neonate and the mother ⁽²⁾ .
- Chronic kidney disease (CKD) is estimated to affect between 8% and 16% of the global population ⁽³⁾ .
- The decline of CKD can result in end stage renal disease (ESRD), which requires an intensive dialysis treatment plan or a kidney transplant ⁽³⁾ .

OBJECTIVES

Aim of review: To evaluate the association between preterm birth and long-term renal health outcomes.

Significance:

- Explore emerging evidence linking preterm delivery to maternal CKD
- Inform clinical risk stratification and postnatal follow-up strategies
- Highlight need for targeted surveillance of CKD in this at-risk population

MATERIALS AND METHODS

Study identification and screening:

- Searches: EMBASE, Medline and CINAHL occurred on the 18th October 2024.
- Citation searching of the included studies was also carried out.
- Studies were screened by two independent reviewers using the PICO eligibility criteria.

Population

Women who have given birth.

Intervention

Preterm labour (<37 weeks gestation).

Comparator

Term labour (>37, <42 weeks gestation).

Outcome

Long-term maternal renal disease.

Data Extraction:

- Data was extracted using a spreadsheet of study characteristics and study outcomes.

Bias Assessment:

- Newcastle Ottawa Scale was used to assess for bias ⁽⁴⁾ , seen in Figure 1.

Data Analysis:

- 6 of the studies presented raw data which meant as could display it via a random-effects meta-analysis.
- 3 studies used hazard ratios to present their data.

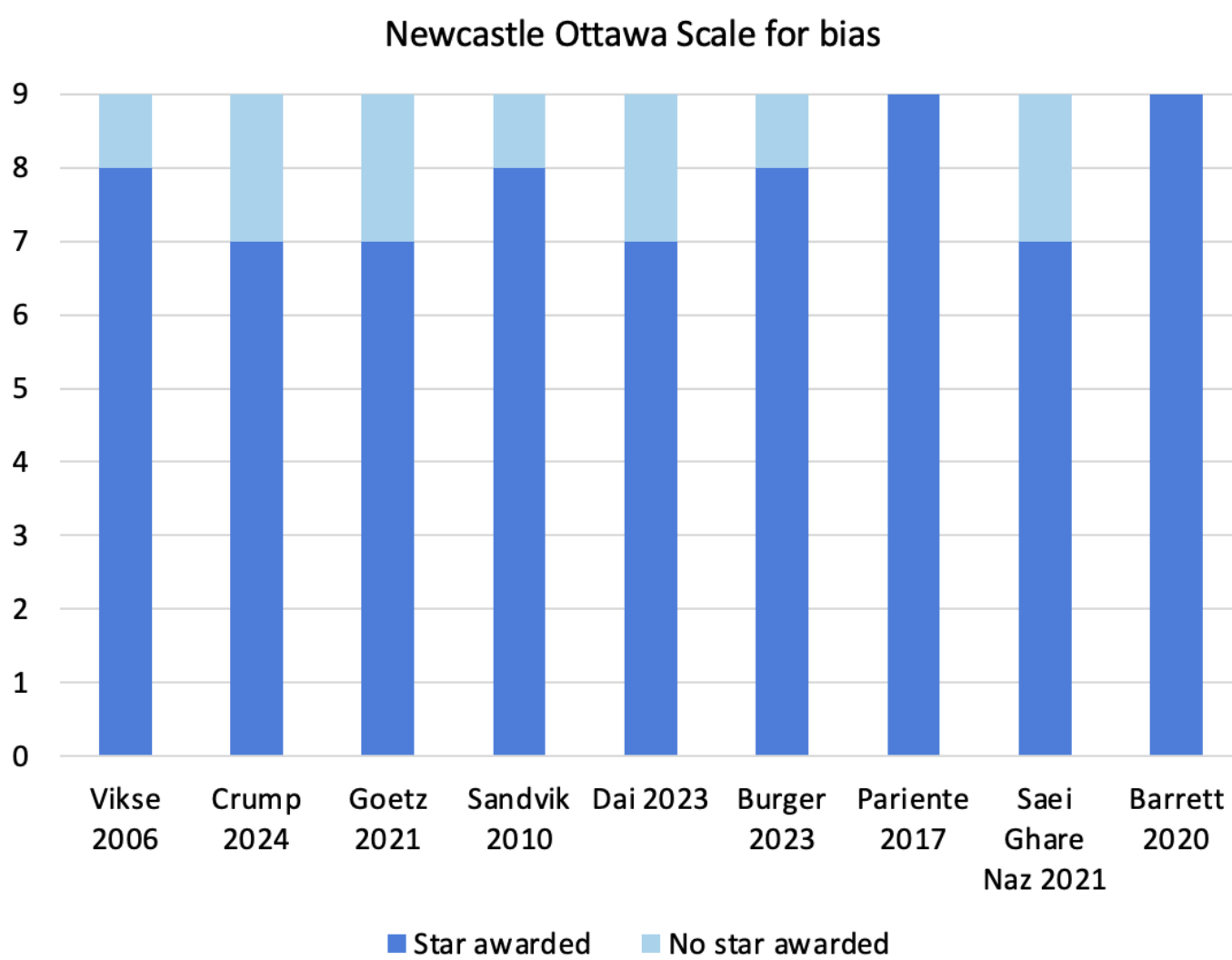


Figure 1. Bar chart showing the Newcastle Ottawa Bias tool used to assess for bias across the included studies.

RESULTS

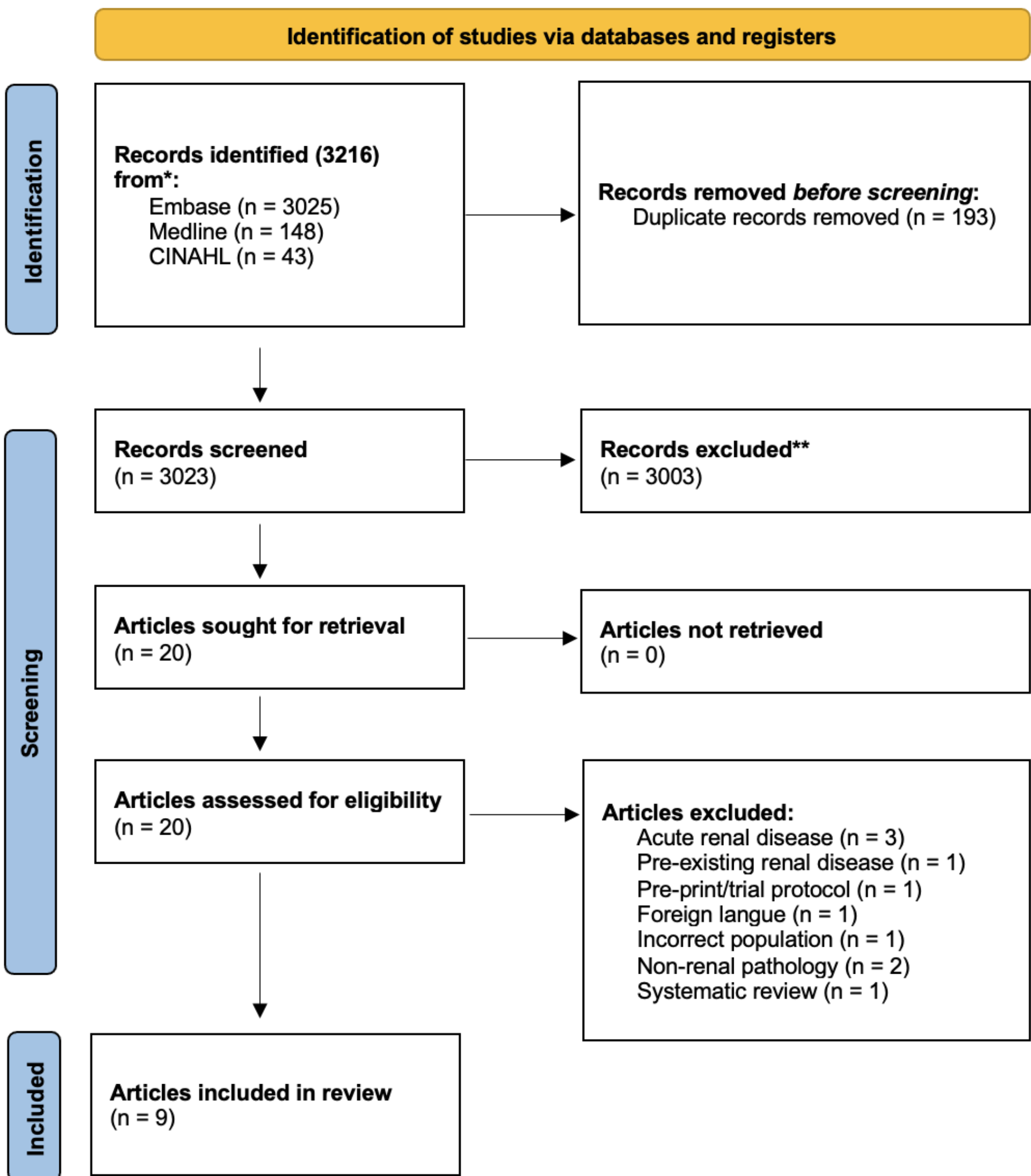


Figure 2. PRISMA flow chart showing the study selection.

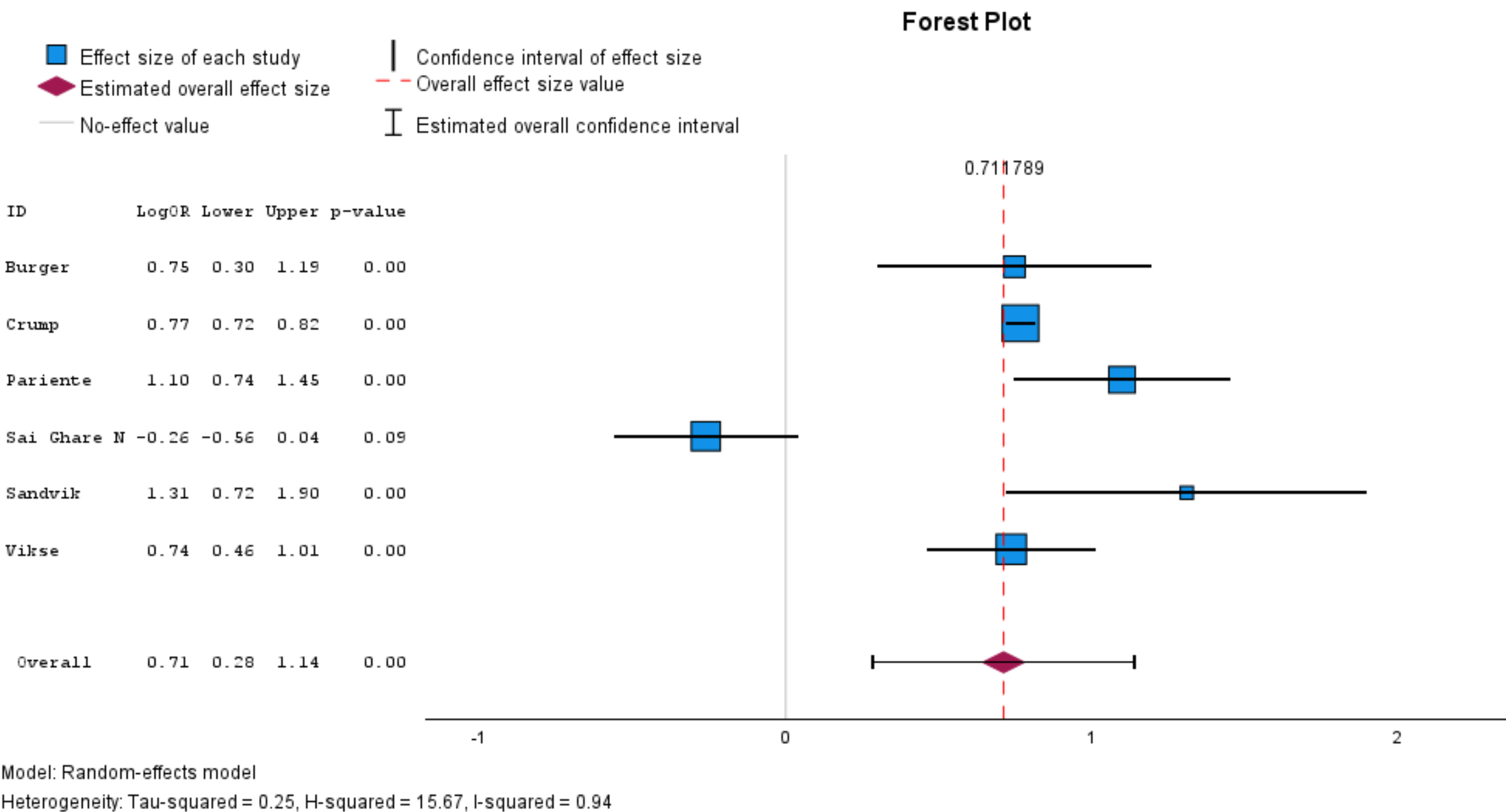


Figure 2. Forest plot summarizing the meta-analysis of the 6 eligible studies. (13, 14, 15, 16, 17, 18)

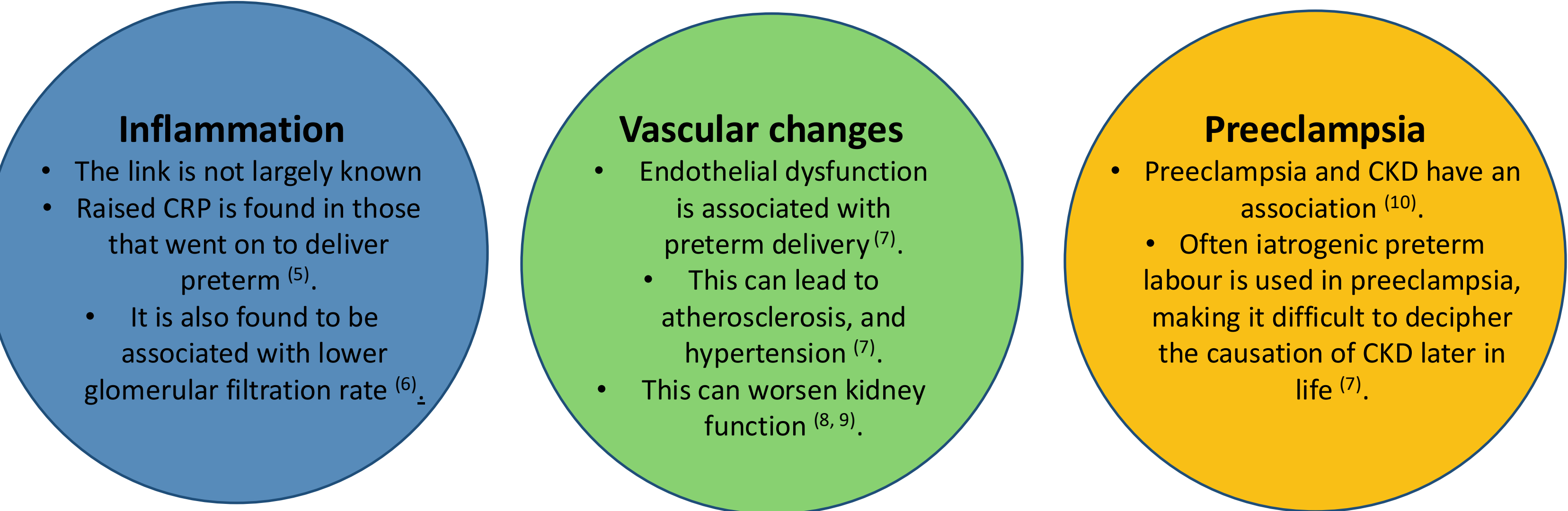
Study characteristics:

- 8 studies were cohort studies, 1 was a cross-sectional study.
- All studies used a population of women who gave birth preterm (<37 weeks).
- There were a range of maternal confounding variables such as smoking, BMI, age and socio-economic background.

Study	Hazard Ratio	95% Confidence Interval	Outcome
Goetz et al., 2021 ⁽⁷⁾	1.79	1.53-2.09	CKD and ESRD
Dai et al., 2023 ⁽¹¹⁾	2.36	1.81-3.08	ESRD
Barret et al., 2020 ⁽¹²⁾	1.47	1.40-1.53	CKD

Table 1. Table showing the hazard ratios for three studies.

DISCUSSION



Clinical Applicability:

- This review gives evidence, supporting the need for healthcare providers to monitor the renal function of women who have had preterm births.

Limitations:

- All studies could not be included in the meta-analysis due to not having access to raw data.
- There was a high level of heterogeneity in the study.
- A meta-regression would be useful to ascertain the reasoning for this.

CONCLUSIONS

- The review gives evidence for the association between preterm birth and long-term maternal renal disease.
- The findings suggest the preterm birth can be an early indication for renal disease.
- Having the knowledge of this could enable an improvement to management of renal disease, and general health outcomes for women.

RECOMMENDATIONS

Enhanced postnatal monitoring:

- Women with a history of preterm delivery should undergo long-term renal function monitoring.

Longitudinal cohort studies:

- There is a need for large, prospective studies that track maternal renal outcomes beyond 10-20 years postpartum.

Preterm birth etiology:

- Distinguish between spontaneous and iatrogenic preterm birth in future research.
- Reduces bias and confounding in CKD risk analysis.

Standardise renal disease definition:

- Ensures consistency in outcome measurement.
- Improves reliability in assessing the association with preterm birth.

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