

Decline of kidney function preceding dialysis initiation in chronic kidney disease patients: a systematic review and meta-analysis

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Background

- Cohort studies in CKD patients point to substantial heterogeneity in rates of kidney function decline preceding dialysis initiation.
- By design, these decline rates can be studied in two types of cohorts:
 - CKD 3-5 cohorts*: patients are followed from a certain point in the pre-dialysis phase and only a part of the patients starts dialysis therapy.
 - Dialysis-based cohorts*: all patients are selected on the fact they initiated dialysis.
- Decline rates obtained from dialysis-based cohorts could give an overestimation of the true underlying kidney function decline prior to dialysis initiation.

Objective

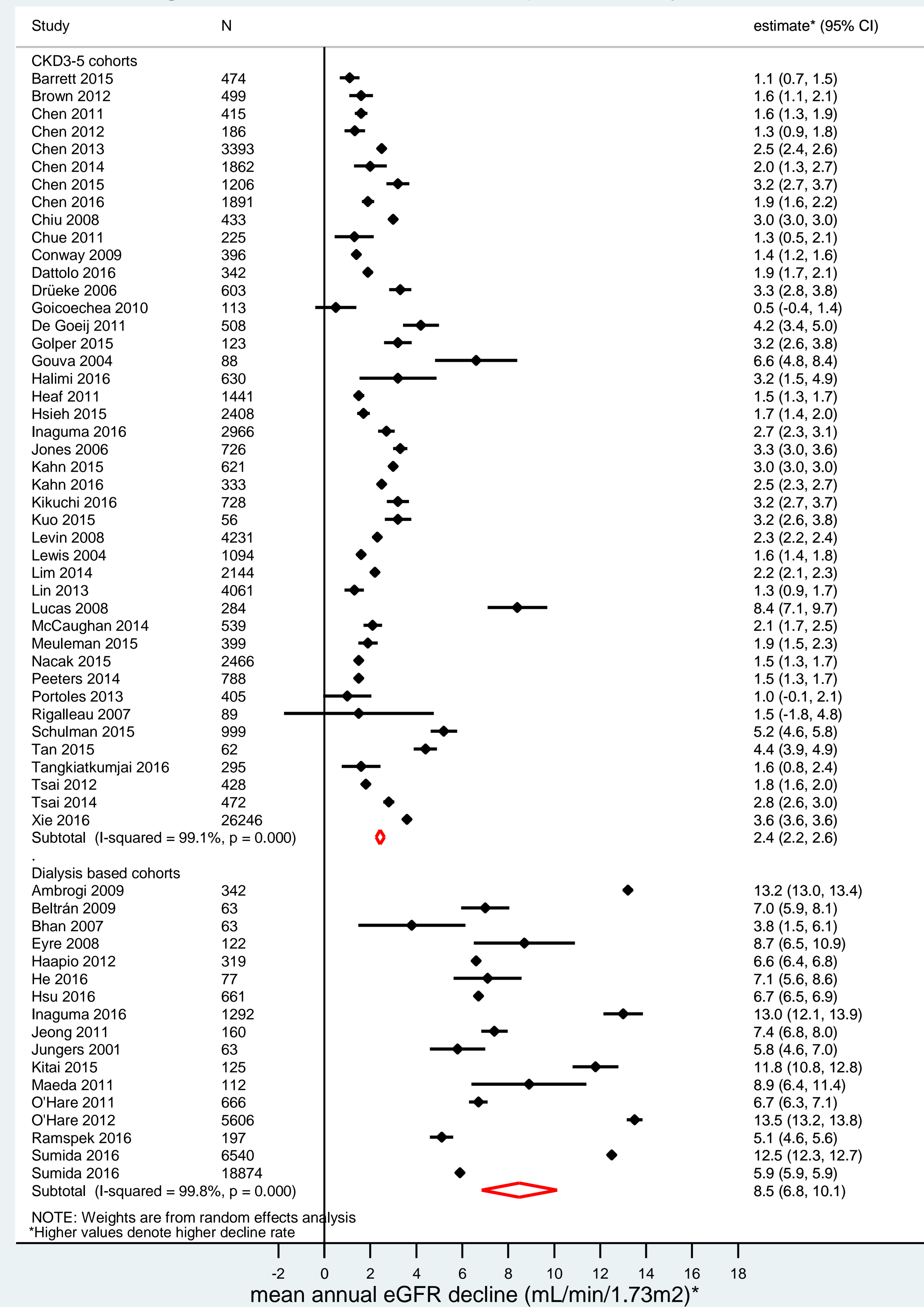
To perform a systematic review and meta-analysis, assessing and comparing the rate of kidney function (eGFR) decline prior to dialysis initiation in CKD patients, in both types of cohorts.

Methods

- Data sources:** We searched PubMed, EMBASE, Web of Science, Cochrane and references of key articles from January 2000 to December 2016 to identify relevant studies.
- Study selection:** Cohort studies reporting a mean annual eGFR decline (mL/min/1.73m²) in the pre-dialysis period were assessed for eligibility.
- Meta-analysis:** To obtain weighted annual mean eGFR declines, random-effects meta-analysis was performed using linear mixed models.
- Meta-regression:** Random-effects meta-regression analysis with preplanned explanatory variables was performed to identify sources of heterogeneity.

Results

Weighted annual eGFR decline prior to dialysis initiation



Characteristics of included cohort studies (n=60)	CKD 3-5 cohort (n=43)	Dialysis-based cohort (n=17)
Total participants	67,668	35,282
Mean age (range)	42-73	56-69
% male (range)	42-97	53-98
% diabetes (range)	0-100	20-100
Mean follow-up until dialysis initiation (years, range)	0.4-8.2	0.2-4.1
Mean baseline eGFR (mL/min/1.73m ² , range)	10-45	6-35

Mean annual eGFR decline per CKD stage 3-5*			
CKD stage	Number of studies	Mean annual eGFR decline (mL/min/1.73m ²)	95% CI
3	20	2.4	2.0-2.7
4	21	2.5	2.2-2.8
5	2	3.0	0.8-5.3

*subgroup analysis in CKD 3-5 cohorts based on mean baseline eGFR

Univariate meta-regression analysis :

- confirmed the great difference in mean annual eGFR decline between CKD 3-5 cohorts and dialysis-based cohorts (difference 6.0 [95%CI 4.8, 7.2] mL/min/1.73m²).
- showed that the mean annual eGFR decline prior to dialysis initiation is neither significantly associated with the duration of follow-up until dialysis initiation, nor with the mean baseline eGFR value, nor with the percentage of diabetes present in the study population of CKD 3-5 cohorts.

Conclusion

Reported mean annual eGFR decline prior to dialysis initiation is much greater in patients from dialysis-based cohorts compared to CKD 3-5 cohorts. CKD 3-5 cohorts should be used for clinical decision-making regarding the management of CKD patients and dialysis initiation.

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