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Association between dietary potassium intake and risk of mortality, CKD progression among chronic kidney disease patients: A systematic review and dose-response meta-analysis

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ADMINISTRATIVE INFORMATION

Support - Shenzhen Natural Science Foundation.

Review Stage at time of this submission - Piloting of the study selection process.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202380034

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 09 August 2023 and was last updated on 09 August 2023.

INTRODUCTION

Review question / Objective Does dietary potassium intake influence mortality or progression of chronic kidney disease?

Rationale Consuming adequate amounts of fruits and vegetables to prevent noncommunicable diseases(such as cardiovascular disease and cancer) was encouraged in general population. In contrast, we recommend that patients with chronic kidney disease, especially end-stage renal disease, limit their intake of potassium-rich fruits and vegetables to prevent hyperkalemia, cardiac arrhythmias, and death. Some guidelines recommend limiting potassium intake to 2-2.5 g/day in patients with end-stage renal disease, but there is little scientific basis. Moreover, the low certainty of the evidence supporting restriction of dietary intake of potassium also deprives patients of the potential benefits of consuming a potassium-rich diet (including improved quality of life with fewer dietary restrictions), which may have adverse effects. we will carry out this systematic review and meta-analysis on cohort studies measuring dietary potassium intakes and the relationship with.

Condition being studied Potential publications analyzed the association of dietary intake of potassium with mortality or progression of CKD, compared dose-response in cohort studies.

METHODS

Search strategy A through search will be performed up to July 2023 by two reviewers within PubMed, Cochrane Library, Scopus, Web of Science, and EMBASE. The following terms were used to search the databases: (potassium[Title/Absract] AND (intake[Title/Absract] OR diet*[Title/Absract] OR Urinary[Title/Absract] OR excretion[Title/Absract])) AND (renal insufficiency, chronic[MeSH] OR renal replacement therapy[MeSH] OR renal dialysis[MeSH] OR peritoneal dialysis[MeSH] OR renal

transplantation[MeSH]) AND (mortality[Title/Absract] OR death*[Title/Absract] OR fatal[Title/Absract] OR survival[Title/Absract]) AND (prospective[Title/Absract] OR longitudinal[Title/Absract] OR follow-up[Title/Absract] OR cohort[Title/Absract] OR retrospective[Title/Absract]). The search strategy will be adapted for each database.

Participant or population Adults≥18 years; CKD stage1-5, including renal replacement therapy and renal transplant recipients.

Intervention Dietary intake of potassium.

Comparator Dose-response analysis, increase for each potassium intake 1g/day.

Study designs to be included Cohort studies.

Eligibility criteria Original articles; written in English; with design was a cohort study; studies should report the associations of histological diagnosed CRC risk with dietary dietary potassium intake from diet using hazard ratio (HR) with 95% confidence interval (CI) to estimate the association for each category of dietary dietary potassium intake.

Information sources The electronic database of PubMed, Cochrane Library, Scopus, Web of Science and EMBASE. In addition, the reference list from original reports and previous reviews will be reviewed, and manually selected for other available publications.The electronic database of PubMed, Cochrane Library, Web of Science and EMBASE. In addition, the reference list from original reports and previous reviews will be reviewed, and manually selected for other available publications.

Main outcome(s) Mortality.

Additional outcome(s) CKD progression.

Data management Excel will be used for study screening, selection, data extraction, risk of bias assessment. Statistical analyses will be performed using Stata 14.0 (Stata Corp, College station, TX).

Quality assessment / Risk of bias analysis The quality of the included studies was evaluated by the Newcastle-Ottawa Scale (NOS) and studies with a score of 6 or higher were considered as high-quality studies.

Strategy of data synthesis A restricted cubic spline regression model will be conducted to explore the possible nonlinear relation between dietary potassium levels and mortality. When the lowest group will be not the reference, HRs and CIs were recalculated relating to the referent for which data were required. In addition, the midpoint of each dietary potassium category will be used if dietary potassium means or median for the category will be not reported in the study. If the highest or lowest categories were open-ended categories, they were considered to have the same amplitude as their neighboring categories If studies reported results for men and women or other subgroups separately, the subgroup-specific estimates were combined by fixed-effects model to produce an overall estimate and each study will be only represented once in the final analysis. If the highest or lowest categories were open-ended categories, they were considered to have the same amplitude as their neighboring categories If studies reported results for men and women or other subgroups separately, the subgroup-specific estimates were combined by fixed-effects model to produce an overall estimate and each study will be only represented once in the final analysis. A two-stage hierarchical regression model will be conducted to calculate the nonlinear dose-response relation across different dietary potassium consecrations. The difference between the medians of category-specific and reference-specific quadratic expressions for dietary potassium will be surveyed based on studies with nonzero dietary potassium level as reference. The two-stage generalized least squares trend estimation method will be used, which first estimated study-specific slope lines and then combined with studies in which the slopes were directly reported to acquire an overall average slope. Then, the dose-response association, assuming within- and between-study variances, will be assessed using spline transformations. Potential nonlinear association will be examined using restricted cubic splines with knots at fixed percentiles of the distribution. A p- value for nonlinearity of the meta-analysis will be estimated by testing the null hypothesis that the coefficient of the second spline will be equal to zero. Moreover, the logarithms of HRs and CIs, the number of mortality and the number of participants across dietary potassium categories were used to estimate linearity in the potential relationships by random-effects dose-response. In linear dose-response the HRs related to 0.5 mmol/L increases in dietary potassium for each study will be estimated. If two different articles reported results of the same study as categorical and continuous separately, the article with the categorical model

will be included in both linear and nonlinear dose-response meta-analyses.

Subgroup analysis Subgroup analyses will be applied to concern risk of bias, trial design, sex, CKD stage and age. The analysis strategy will be adapted for search resuls.

Sensitivity analysis The heterogeneity between studies will be assessed by Q and I2 tests ($p<0.05$), which provide the relative amount of variance of the summary effect due to the between-study heterogeneity. The Egger's test of asymmetry and funnel plot asymmetry test will be used to evaluate any existing publication bias. In order to assess the impact of excluding one single study on overall HR estimation, sensitivity analysis will be performed.

Language restriction None.

Country(ies) involved China.

Keywords Dietary potassium; potassium intake; chronic kidney disease; mortality; cohort study; meta-analysis.

Dissemination plans This meta-analysis will be published at a future date in an international or chinese scientific journal.

Contributions of each author

Author 1 - Qian Feng - Contributed to the design, bibliography review, analysis and draft manuscript.
Email: 1030455251@qq.com
Author 2 - Xiaowei Han - Contribute to criteria selection, bibliography review, modify the manuscript and provide feedback in the overall review of the study.
Author 3 - Mengxia Zhu - Contribute to quality analysis and the overall review of the study.
Author 4 - Shuxian Li - Contribute to provide statistical expertise.
Author 5 - Shikun Qi - Participate in the statistical analysis, criteria selection and collaborate in the overall review of the study.