More Good News: Coffee Prevents Kidney Stones

Pietro Manuel Ferraro and Gary C. Curhan

Kidney stone disease is increasingly common in the general population; recent estimates suggest a prevalence higher than 10% in the United States. To reduce the burden and associated high costs for health systems, a large body of literature has focused on modifiable risk factors, especially dietary, thought to play a role in the pathogenesis of the disease. However, given the time and large expense required to perform a randomized controlled trial, most of the available evidence on the benefit or harm of certain dietary factors derives from observational studies, which—depending on the study design—could be potentially subject to issues such as reverse causation or residual confounding. To overcome this limitation and derive causal estimates without an expensive trial, a technique called Mendelian randomization (MR) has been devised, which takes the random allocation of genes at conception and uses them as instrumental variables to explore the causal association between an exposure and an outcome. When the assumptions of MR hold, estimates obtained with this technique can be regarded as causal and unbiased estimates of the true association of interest.

Previous studies have consistently reported an inverse association between intake of coffee and caffeine and the risk of incident kidney stones, suggesting a protective role for those factors. In this issue of AJKD, Yuan and Larsson apply the MR approach to evaluate the potential causal association between intake of coffee and caffeine and development of kidney stones.

Yuan and Larsson used publicly available data and selected 12 single-nucleotide polymorphisms (SNPs) associated with coffee consumption from meta-analyses of specific genome-wide association studies (GWAS) performed on individuals of European ancestry. Overall, the selected instruments only explained up to 1.3% of the variance in intake, but this is in line with previous MR analyses. Coffee and caffeine consumption were estimated through food frequency questionnaires. Betas and standard errors for the association between those SNPs and kidney stones (defined by ICD codes) were obtained from GWAS performed on 2 independent cohorts, the UK Biobank and the FinnGen Consortium. Using the inverse-variance weighted method, the authors computed causal estimates for coffee intake (40% lower odds of stones for a 50% increase in intake, corresponding to an increase from 1 to 1.5 cups per day) and caffeine intake (19% lower odds of stones for an 80 mg increase in intake, corresponding to 1 additional cup of dehydrating and should be avoided by kidney stone formers. In fact, this study provides causal evidence that coffee and caffeine reduce the risk of kidney stones.

In conclusion, the integration of high-quality observational studies, MR approaches, multi-omics data, and interventional studies will be the key to expand our understanding of the pathogenesis of kidney stone disease and thus to deliver the best possible care for the patient. The new data from the study by Yuan and Larsson combined with the compelling observational data should put to rest the old and incorrect misconception that coffee is dehydrating and should be avoided by kidney stone formers. In fact, this study provides causal evidence that coffee and caffeine reduce the risk of kidney stones.

Article Information

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