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Coffee and Tea Consumption and Risk of Kidney Stones

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ABSTRACT

Introduction: Kidney stones are a common urological disease that causes significant pain. The most prevalent kind of kidney stone is calcium oxalate, which is formed in Randall's plaque on the papillary surfaces of the kidney. Stone formation involves supersaturation, crystal nucleation, growth or aggregation, and their retention in the kidney or renal collecting system, leading to additional aggregation. The effect of dietary factors on this disease has been the subject of various studies. We aimed to perform a systematic review of observational studies on the associations of coffee and tea consumption with the risk of kidney stones in adults.

Search Strategy: PubMed, Scopus, and Web of Science online databases were systematically searched using "Tea," coffee," and "kidney stone". The Cochrane risk of bias tool was used to perform quality assessment.

Results: In the current systematic review, we found 12 observational studies, five of which assessed coffee consumption for kidney stones. Among them, two studies revealed a significant inverse association between coffee consumption and the risk of kidney stones. Such protective association was also seen in 6 studies on tea consumption and the risk of kidney stones. The protective effect of these two drinks can be explained by several mechanisms, such as increased water intake, which dilutes the mineral concentration in the urine. Other possible mechanisms are related to the presence of caffeine with diuretic effects, leading to increased urine flow rate and calcium excretion. Furthermore, it can reduce the adhesion of calcium oxalate crystals to renal tubular cells and translocate annexin A1 (a crystal-binding protein) from the apical surface of renal tubular cells into the cytoplasm. Thus, the ability of the cells to bind crystals is subsequently reduced. The inhibitory effects of caffeine may be enhanced by other compounds present in coffee and tea, such as antioxidants. The oxidant-antioxidant imbalance damages oxidative stress and is essential in kidney stone development.

Conclusion and Discussion: This review study supports a protective role for coffee and tea, mainly green tea with lower oxalate content and higher antioxidants, against stone formation.

Keywords: Coffee, Kidney, Tea