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Prophylactic administration of allopurinol with standard IV hydration in preventing contrast-induced nephropathy in patients undergoing cardiac catheterization: a meta-analysis and systematic review

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BACKGROUND: Current advancements has made contrast-guided coronary interventions widely available, however these procedures entail the risk of developing Contrast-induced nephropathy which is associated with increased morbidity and mortality of patients. One of the mechanisms that has been investigated in the development of CIN is the presence of hyperuricemia. Elevated uric acid levels may injure the microscopic tubules causing kidney injury and may induce the production of inflammatory factors furthering damage. Thus, it has been postulated that using urate lowering agents may be beneficial in preventing CIN.

OBJECTIVE: To determine the efficacy of giving oral prophylactic allopurinol along with standard IV hydration in reducing the incidence of contrast-induced nephropathy.

METHODS: We conducted a systematic literature search using PUBMED, MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, Cochrane Kidney and Transplant register of Studies, Google Scholar, and Research Gate. Studies fulfilling the inclusion and exclusion criteria were quality assessed based on the criteria provided in the Cochrane Handbook for Systematic Reviews of Interventions. The incidences of Contrast-Induced Nephropathy were combined and analyzed using a fixed-effect model in Review Manager (Rev Man) Version 5.3 with 95% confidence interval.

RESULTS: Five studies were included with a total of 753 patients. Results showed that there is a 63% decrease in CIN [RR = 0.37 (0.25 to 0.54, 95% CI, Z = 5.10, p < 0.00001)] after prophylactic administration of allopurinol with standard IV hydration as compared to those who received hydration alone. When adjusted for heterogeneity, there remains a 35% decrease in the incidence of CIN [RR = 0.65 (0.43 to 0.99, 95% CI, Z = 2.02, p = 0.04) in patients given prophylactic allopurinol.

CONCLUSION: Oral prophylactic allopurinol administration may be protective in the development of CIN in patients undergoing coronary interventions. However larger, multi-centered randomized-controlled trials are needed to validate this claim.