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The Role of Dietary Fiber Supplementation in Regulating Uremic Toxins in Patients With Chronic Kidney Disease: A Meta-Analysis of Randomized Controlled Trials

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Objectives

The results of previously published meta-analyses showed that dietary fiber could reduce the levels of *p*-cresyl sulfate, blood urea nitrogen, and creatinine in patients with chronic kidney disease (CKD). However, these results were based on some trials with pre-post design and randomized controlled trials of low quality. Additionally, it has been suggested that the dosage and duration of fiber supplementation and patients' characteristics potentially influence the effect of dietary fiber in reducing uremic toxins, but it would appear that no research has provided reliable evidence.

Design and Methods

We searched PubMed, Web of Science, and Cochrane Library. Data were pooled by the generic inverse variance method using random effects models and expressed as standardized mean difference (SMD) with 95% confidence interval (CI). Heterogeneity was quantified by I^2. Publication bias was evaluated by Egger's test.

Results

Ten randomized controlled trials involving 292 patients with CKD were identified. Dietary fiber supplementation can significantly reduce the levels of indoxyl sulfate (SMD = −0.55, 95% CI = −1.04, −0.07, P = .03), *p*-cresyl sulfate (SMD = −0.47, 95% CI = −0.82, −0.13, P < .01), blood urea nitrogen (SMD = −0.31, 95% CI = −0.58, −0.03, P = .03), and uric acid (SMD = −0.60, 95% CI = −1.02, −0.18, P < .01), but not on reducing creatinine (SMD = −0.31, 95% CI = −0.73, 0.11, P = .14). In subgroup analyses, the reduction of indoxyl sulfate was more obvious among patients on dialysis than patients not on dialysis (P for interaction = .03); the reduction of creatinine was more obvious among patients without diabetes than those with diabetes (P for interaction <.01).

Conclusions

This meta-analysis indicates that dietary fiber supplementation can significantly reduce the levels of uremic toxins in patients with CKD, with evidence for a more obvious effect of patients on dialysis and without diabetes. These findings inform recommendations for using dietary fiber to reducing the uremic toxin among CKD patients in clinical practice.

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