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## **B-Vitamin Supplementation in Patients with End-Stage Chronic Kidney Disease on Hemodialysis: A Review of Randomized Controlled Trials Using Recent Data**

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**Objectives:** Chronic kidney disease (CKD) patients have low levels of erythropoietin which can lead to anemia. Homocysteine appears to be an independent risk factor for cardiovascular illnesses and a high level is common in CKD. This review aimed to discuss the effectiveness of B-vitamin supplementation on homocysteine and hemoglobin among hemodialysis patients based on recent studies.

**Methods:** Materials for this review were obtained by searching ISI Scopus, Google Scholar, Pubmed, and Cochrane databases. Keywords used as search terms were "b-vitamin supplementation", "homocysteine", "hemoglobin", "hemodialysis", and "end-stage CKD". Boolean operators (AND & OR) are applied for searching combination words to get comprehensive results. The list of references in studying articles was used to find further studies.

**Results:** B-vitamin (including folic acid) appears to decrease homocysteine levels and vitamin B12 converts homocysteine to methionine. Vitamin B12 and folic acid are major determinants of homocysteine metabolism and supplementation with vitamin B12 and folic acid is effective in normalizing homocysteine levels and all of the studies showed significant differences after the intervention. Results of five reviewed studies showed the decreasing of homocysteine levels after B-vitamin supplementation after 2-month and 38-month periods of intervention. Meanwhile, the mean serum folic acid and vitamin B12 at the end of the month showed a significantly increasing from 14.3 (6.3-84.1) nmol/L and 334 (148-994) pmol/L. A greater beneficial effect was observed among those trials that received the combination of oral folic acid, 15mg/day, and intravenous injection of vitamin B12, 1000µg/4 weeks (post-dialysis) for a period of 8 weeks (mean reduction of tHcy was 34.76%). Vitamin B12 gave significant impacts on hemoglobin levels and was safe for CKD patients undergoing hemodialysis.

**Conclusions:** This review showed that B-vitamin supplementation significantly improved homocysteine and hemoglobin levels. High-dose vitamin B12 and folic acid were effective in reducing homocysteine levels in hemodialysis patients.

Table 1. Main characteristics of included studies