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The beneficial effect of vitamin A for all-cause mortality according to the baseline kidney function: Results from the National Health and Nutrition Examination, 1999-2017

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Objectives: As an antioxidant, vitamin A has an essential role in overall health including vision, immune system, and cell growth. Decrease in kidney function is closely related to exposure to oxidative stress, and the role of vitamin A according to kidney function has not been well evaluated.

Methods: We used data from the US National Health and Nutrition Examination Survey 1999-2017. Based on 24-hr dietary recall, the intake of vitamin A was divided by quartile; the 4th quartile was regarded as a reference. Intake of vitamin A and blood level was evaluated using two categories with retinoid and carotenoids, including retinol, alpha-carotene, beta-carotene, lycopene, and lutein. Subjects were divided into three groups based on the estimated glomerular filtration rate (eGFR): ≥ 90 , 60-90, and < 60 mL/min/1.73 m². We used a multivariate Cox proportional hazard model.

Results: A total of 39,393 subjects were included in the study. The risk for all-cause mortality was significantly increased in subjects included in the 1st quartile of retinoid (adjusted hazard ratio [aHR] 1.10, 95% confidence interval [CI] 1.04-1.21) and 1st quartile of carotenoid (aHR 1.23, 95% CI 1.13-1.33). In subgroup analysis based on the eGFR, lower intake of retinoid did not show a significant association with all-cause mortality. In contrast, lower intake of carotenoid increased mortality irrespective of baseline eGFR (aHR 1.21, 95% CI 1.01-1.45 in eGFR ≥ 90 ; aHR 1.24, 95% CI 1.10-1.40 in eGFR 60-90; aHR 1.22, 95% CI 1.06-1.40 in eGFR < 60). Among the carotenoids, intake of beta-carotene and lutein showed prominent association with all-cause mortality. The lowest blood level in each component of vitamin A significantly increased the risk of all-cause mortality regardless of baseline kidney function.

Conclusions: As an essential micronutrient, deficiency vitamin A, especially in lower level of carotenoid components significantly increased all-cause mortality irrespective of kidney function.