Objective: This study aimed to explore the association between plasma folate, vitamin B12 levels and chronic kidney disease (CKD).

Table 1. Demographic characteristics, lifestyle, and disease histories between CKD cases and controls.

Table 2. The association between levels of total urinary arsenic, blood cadmium and lead, and plasma vitamin B12 and folate in CKD.

Note: Values are expressed as the mean ± standard error, or the number (percent). Abbreviations: CKD, chronic kidney disease; CI, confidence interval. * Adjusted for gender, age, educational level, alcohol, coffee, and tea consumption, analgesic usage, diabetes, hypertension, and red blood cell lead and cadmium levels. § Adjusted for gender, age, educational level, alcohol, coffee, and tea consumption, analgesic usage, diabetes, hypertension, red blood cell lead and cadmium levels; other metal (red blood cell lead or cadmium) and plasma vitamin B12. ** Adjusted for gender, age, educational level, alcohol, coffee, and tea consumption, analgesic usage, diabetes, hypertension, red blood cell lead and cadmium; other metal (red blood cell lead or cadmium) and plasma vitamin B12, folate levels, and chronic kidney disease.

Preliminary study of the association between plasma vitamin B12, folate levels and chronic kidney disease in a Taiwanese population.

Yu-Mei Hsieh 1,2, Yuh-Fang Lin 3,4, Horng-Shong Shiu 1, Hsi-Hsien Chen 6,7, Ying-Chin Lin 6,8, Wen-Chi Chu 9, Ya-Lu Huang 2,10

1. Department of Family Medicine, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan.
2. Department of Public Health, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan.
3. Graduate Institute of Clinical Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan.
4. Division of Nephrology, Department of Internal Medicine, Shuang Ho Hospital, Taipei Medical University, Taipei, Taiwan.
5. Division of Nephrology, Department of Internal Medicine, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan.
6. Division of Nephrology, Department of Internal Medicine, Shuang Ho Hospital, Taipei Medical University, Taipei, Taiwan.
7. Department of Chinese Medicine, Chiung Kang University of Medicine, Kaohsiung, Taiwan.
8. Department of Diagnostic Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan.
9. Graduate Institute of Medical Sciences, College of Medicine, Taipei Medical University, Taipei, Taiwan.
10. Department of Family Medicine, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan.

Methods:

This study aimed to explore the association between plasma folate, vitamin B12 levels and chronic kidney disease (CKD) in a Taiwanese population. The association between plasma folate, vitamin B12, and folate levels in CKD cases and controls. Controls consisted of the eGFR of less than 60 mL/min/1.73m² that continued for 3 months were defined as having stages 3-5 CKD. The ORs of blood concentration on CKD in the low mL group. Plasma folate and vitamin B12 levels were measured using a Simul-TRAC-SNBradiassay. Red blood cell cadmium and lead concentrations were measured by ICP-MS. Urinary arsenic species were determined by HPLC-HG-AAS.

Results:

The distribution of educational level, alcohol, coffee, tea consumption, analytic use frequency, diabetes and hypertension status was different significantly between CKD cases and controls. The OR of CKD was significantly lower in subjects with higher education levels or alcohol, coffee and tea consumption than that in patients with lower education levels or non-drinkers. The OR for CKD in patients with diabetes or hypertension was significantly higher than that in patients without diabetes or were non-monomositive. We found that the B12 levels and the red blood cell lead, cadmium levels and total arsenic urinary concentration (μg/creatinine) were significantly correlated with the increased OR for CKD. Subjects with high B12 levels (> 9.54 pg/mL) had a significantly higher odds ratio (OR) and 95% confidence interval (CI) (2.04, 1.36–3.56) for CKD compared to those with low B12 levels (< 6.27 pg/mL). Plasma B12 levels was significantly negatively correlated to eGFR. We conducted a stratified analysis for plasma vitamin B12. It was found that the ORs of blood concentration on CKD in the low-plasma vitamin B12 layer seemed to be higher than that in the high-plasma vitamin B12 layer.

Conclusion: These findings may suggest that the plasma B12 levels will decline the eGFR then increase the OR of CKD. And vitamin B12 may be the OR of CKD related to total blood lead. The potential mechanisms need further studies to be illustrated.

Keywords: Vitamin B12, folate, cadmium, lead, arsenic, chronic kidney disease

Table 3 The association between levels of total urinary arsenic, blood cadmium and lead stratified by B12 levels.