

Study identifies trends of vitamin B6 status in US population sample

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In an epidemiological study, Tufts University researchers identified trends of vitamin B6 status in a sample of the United States population based on measures of plasma pyridoxal 5'-phosphate (PLP) levels in the bloodstream. Plasma PLP is the indicator used by the federal government to set the current Recommended Dietary Allowance (RDA) of vitamin B6, a nutrient essential for red blood cell function and important for maintaining a healthy immune system and blood glucose levels.

"Across the study population, we noticed participants with inadequate vitamin B6 status even though they reported consuming more than the Recommended Daily Allowance of vitamin B6, which is less than 2 milligrams per day," says Martha Savaria Morris, PhD, an epidemiologist at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University. "We also identified four subgroups where this trend seemed most prominent: women of reproductive age, especially current and former users of oral contraceptives, male smokers, non-Hispanic African-American men, and men and women over age 65." Someone with inadequate vitamin B6 status is at risk of becoming Vitamin B6 deficient should their vitamin B6 levels drop too low.

Corresponding author Morris and colleagues studied 7,822 blood samples of men and women ages one-year and older collected from the 2003-2004 National Health and Nutrition Examination Survey (NHANES). Vitamin B6 inadequacy was defined as a plasma PLP concentration less than 20 nmol/L. To the authors' knowledge, the

current study is the first large scale study to use plasma PLP concentrations to evaluate vitamin B6 status in free-living people of all ages. The investigators were also able to consider whether the current RDA guaranteed adequate vitamin B6 status because study participants were questioned about supplement use and two days' worth of food intake.

Eleven percent of supplement users and nearly a quarter of non-users demonstrated plasma PLP blood levels of less than 20 nmol/L. Within the four sub-groups where vitamin B6 inadequacy was most prominent, the prevalence of low plasma PLP levels significantly exceeded 10 percent—even among those who consumed 2 to 2.9 milligrams per day of vitamin B6. The RDAs for vitamin B6 in men and women who are not pregnant or lactating are as follows: 1.3 mg per day for men and women ages 19-50, 1.7 mg per day for men over age 50 and 1.5 mg for women over age 50.

Writing in the May 2008 issue of the American Journal of Clinical Nutrition, Morris and colleagues noted a stark contrast in plasma PLP levels between women of childbearing age (ages 13 to 54) and their male peers. "When we looked specifically at the plasma PLP levels in women of childbearing age, we noticed they were significantly lower than in males in approximately the same age group." Morris continues, "Most importantly, the data suggest that oral contraceptive users have extremely low plasma PLP levels. Three quarters of the women who reported using oral contraceptives, but not vitamin B6 supplements, were vitamin B6 deficient."

A pattern of low vitamin B6 status also surfaced in menstruating women who reported using oral contraceptives but who were no longer using them at the time of the NHANES survey. Among women in this sub-group who were not taking vitamin B6 supplements, 40 percent demonstrated plasma PLP blood levels below the cut-off for vitamin B6

inadequacy. Morris says, that although these results are somewhat surprising, the link between oral contraceptive use and vitamin B6 deficiency remains unclear. "The vitamin could be stored elsewhere in the bodies of the oral contraceptive users, or in a different form, since our study only examined plasma PLP."

To further support their findings, Morris and colleagues measured homocysteine levels in the blood and compared them against the plasma PLP measures. Homocysteine is an amino acid that can accumulate in the blood if vitamin B6 levels are too low. Though study participants using oral contraceptives at the time of the survey did not demonstrate elevated homocysteine levels, the homocysteine concentrations of former users were significantly higher than those of women who had never used oral contraceptives. Morris says this could mean that oral contraceptive use has an effect on vitamin B6 status that is masked during use by acute effects of the exposure.

Because the study shows association and not causation, Morris stresses that further research is necessary to determine whether the RDA for vitamin B6 is high enough. "We have identified populations with a high prevalence of apparently inadequate vitamin B status," Morris says. "However, it is important to recognize that signs of deficiency are not seen at plasma PLP concentrations of 20 nmol/L and that dietary assessment is imperfect."

According to the National Institutes of Health (NIH), vitamin B6 deficiency is rare in the United States, but it can cause a form of anemia similar to iron deficiency anemia. Vitamin B6 is widely distributed in the American diet, and baked potatoes, bananas, 100 percent fortified cereals and chicken are particularly good sources. Morris says, "The question our study raises is whether, due to aging, genetics, or exposures, some population subgroups need supplements to achieve the current biochemical definition of adequate status."

Source: Tufts University

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