PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Published online March 2, 2009
PEDIATRICS Vol. 123 No. 3 March 2009, pp. 917-923 (doi:10.1542/peds.2008-1173)

ARTICLE

Maternal Vitamin B_{12} Status and Risk of Neural Tube Defects in a Population With High Neural Tube Defect Prevalence and No Folic Acid Fortification

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OBJECTIVE. Folic acid fortification has reduced neural tube defect prevalence by 50% to 70%. It is unlikely that fortification levels will be increased to reduce neural tube defect prevalence further. Therefore, it is important to identify other modifiable risk factors. Vitamin B_{12} is metabolically related to folate; moreover, previous studies have found low B_{12} status in mothers of children affected by neural tube defect. Our objective was to quantify the effect of low B_{12} status on neural tube defect risk in a high-prevalence, unfortified population.

METHODS. We assessed pregnancy vitamin B_{12} status concentrations in blood samples taken at an average of 15 weeks' gestation from 3 independent nested case-control groups of Irish women within population-based cohorts, at a time when vitamin supplementation or food fortification was rare. Group 1 blood samples were from 95 women during a neural tube defect–affected pregnancy and 265 control subjects. Group 2 included blood samples from 107 women who had a previous neural tube defect birth but whose current pregnancy was not affected and 414 control subjects. Group 3 samples were from 76 women during an affected pregnancy and 222 control subjects.

RESULTS. Mothers of children affected by neural tube defect had significantly lower B_{12} status. In all 3 groups those in the lowest B_{12} quartiles, compared with the highest, had between two and threefold higher adjusted odds ratios for being the mother of a child affected by neural tube defect. Pregnancy blood B_{12} concentrations of <250 ng/L were associated with the highest risks.

CONCLUSIONS. Deficient or inadequate maternal vitamin B_{12} status is associated with a significantly increased risk for neural tube defects. We suggest that women have vitamin B_{12} levels of >300 ng/L (221 pmol/L) before becoming pregnant. Improving B_{12} status beyond this level may afford a further reduction in risk, but this is uncertain.

Key Words: vitamin B_{12} • cobalamin • neural tube defects • folic acid fortification • folate

Abbreviations: NTD—neural tube defect • B_{12}—vitamin B_{12} • AP—affected pregnancy • NAP—nonaffected pregnancy • RCF—red cell folate • OR—odds ratio

Accepted Jul 22, 2008.