

Multivitamin Use and Heart and Limb Defects

Previous research shows women taking multivitamins containing folic acid around the time they become pregnant are less likely to have babies with neural tube defects and oral clefts.

This study by the California Birth Defects Monitoring Program is the largest to date looking at multivitamin use in relation to 2 other serious birth defects: conotruncal heart defects and limb reduction defects. Together, these conditions occur in about 1 in 1000 infants—over 4000 babies born each year in the US.

30%-36% RISK REDUCTION SEEN

Among women interviewed, those who had taken folic acid-containing multivitamins during the month before conception or the first 2 months of pregnancy had 30% less chance of having babies with heart defects and a 36% lower risk for limb defects. The risk reduction did not depend on demographic factors such as mother's age, race/ethnicity, or education level. Higher folic acid intake was not associated with greater risk reduction.

FORTIFIED CEREAL ALSO LOWERS RISK

One bowl of vitamin-fortified cereal contains at least 0.1 milligrams of folic acid—25% of the daily level recommended for women of childbearing age.

Among women who did not take multivitamins, those consuming fortified cereal had lower risks for both heart and limb defects.

IS FOLIC ACID RESPONSIBLE?

Most studies of vitamins and birth defects have focused on folic acid. Yet few women take folic acid alone; most get folic acid from multivitamins. In this study, only 8 women used a vitamin supplement without folic acid and only 4 took folic acid alone.

We can't say whether the reduced risk is due to folic acid, another component of multivitamins, or some other health behavior common in women who take vitamins. Until this is clarified, women of childbearing age should follow current US Public Health Service recommendation: consume 0.4 milligrams of folic acid daily. This is the amount found in most multivitamins.

DIFFERENCES IN DEFECT SUBTYPES

Occurring early in development, conotruncal defects involve faulty septation of the heart's chambers and major blood vessels leading to and from the heart. The reduced risk seen in mothers who used multivitamins was mainly in one defect—tetralogy of Fallot—with less reduction in other types of conotruncal heart abnormalities.

Limb reduction defects involve shortened or missing limbs, and encompass many different subtypes. Much of the overall decreased risk was seen in longitudinal defects (top figure), abnormalities affecting a lengthwise segment of the arm or leg. There was no risk reduction in transverse defects (bottom figure), where all structures below the point of the defect are absent. Risk reduction figures for other limb defect subgroups are imprecise because the number of cases was small.



POPULATION-BASED STUDY DESIGN

All cases were identified through ongoing surveillance by the California Birth Defects Monitoring Program registry, an actively ascertained, population-based database of information on children with birth defects. Specific study elements follow:

- **Birth defects:** Conotruncal heart defects and limb reduction defects. Eligible heart defects included tetralogy of Fallot, dextro-transposition of the great arteries, double outlet right ventricle, truncus arteriosus, pulmonary valve atresia with ventricular septal defect, and aortico-pulmonary window. Limb defects were classified by type and as having a known or unknown cause; most “known” defects were genetic.
- **Participants:** Mothers of liveborn infants with conotruncal heart defects or limb reduction defects identified from among 344,214 monitored births in 1987-1988, and a randomly selected comparison group of mothers delivering infants

without birth defects in the same years. Mothers of 207 conotruncal cases and 178 limb reduction cases agreed to be interviewed—about 85% of those contacted. Interviews also took place with 481 mothers in the comparison group—76% of those contacted.

- **Diagnostic information:** Abstracted from hospital medical records. Heart defects were documented by echocardiography, cardiac catheterization, surgery, or autopsy reports. Limb defects were confirmed by x-ray, surgery, or autopsy.
- **Interview:** Telephone interviews in English or Spanish asking about vitamin use, cereal consumption, medical and family history, and environmental exposures during pregnancy.
- **Folic acid intake:** Estimated from questions about vitamin/mineral supplement composition and frequency of use.

REFERENCE: Shaw GM, O'Malley CD, Wasserman CR, Tolarova MM, Lammer EJ. Maternal periconceptional use of multivitamins and reduced risk for conotruncal heart and limb reduction defects among offspring. American Journal of Medical Genetics 1995; 59(4):536-545.

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