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Trends and predictors of folic acid awareness and periconceptional use in pregnant women

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Objective: The purpose of this study was to describe recent trends in folic acid awareness and use in the periconceptional period among pregnant women in relation to maternal sociodemographic and other relevant factors.

Study design: From 1988 to 2002, 16,555 women from the Slone Epidemiology Center Birth Defects Study were interviewed about medication use before and during pregnancy (which included multivitamins and folic acid), about whether they were aware of any vitamins that might decrease the risk of birth defects, and about sociodemographic and medical factors.

Results: Awareness of folic acid benefits increased from 0 in 1988 to 50% in 1996 and thereafter. The use of folic acid in the periconceptional period increased from 15% in 1988 to 40% in the last few years. Maternal education was a strong independent predictor of both awareness and use as were ethnicity, whether the pregnancy was wanted, family income, and whether a health care provider was consulted before planning.

Conclusion: Promoting the use of folic acid supplements, particularly among these disadvantaged groups, is essential to further decrease the prevalence of neural tube defects.

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For more than a decade, there has been experimental and epidemiologic evidence that an increased periconceptional intake of folic acid reduces the risk of neural tube defects (NTDs)[1-4] and possibly other birth defects.[4-8] For that reason, folic acid supplementation has been recommended for women of childbearing age.[9] To help achieve that objective, the US Food and Drug Administration required that, as of 1998, all cereal grain products had to be fortified with 140 μg of folic acid per 100 g of grain. However, it has been estimated that the amount of folic acid that women receive from a balanced diet that includes fortified grain might be only 25% of

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the recommended 400 μg/day intake for pregnant women.[10,11] Although spina bifida and anencephaly prevalence fell by approximately 20% after food fortification,[12,13] the decrease is less than predicted from randomized trials with folic acid supplementation.

Because the current fortification level is unlikely to achieve the maximum benefits of folic acid–related reduction of birth defects, efforts have been undertaken to promote the daily use of a 400-μg folic acid supplement by women of reproductive age.

Little research has focused on the results of such promotional efforts. Most studies thus far considered awareness and the use of folic acid in women of childbearing age in general, whereas the ultimate target group is women who will become pregnant.[14,15] Only 2 small-scale studies have considered the actual periconceptional use of folic acid among pregnant women.[16,17] Finally, there is inadequate information about the factors that predict awareness and/or use, and such information is necessary for the development of programs that are designed to increase periconceptional folic acid use.

We evaluated trends in folic acid awareness and periconceptional use of folic acid among a sample of pregnant women over the past 15 years and explored maternal sociodemographic variables that are associated currently with folic acid awareness and periconceptional use.

Methods

We used data from the Slone Epidemiology Center Birth Defect Study, a case-control surveillance program that has been conducted since 1976, in which malformed infants are ascertained from birth and tertiary care hospitals in the greater metropolitan areas of Boston (Mass), Philadelphia (Pa), and Toronto (Canada). Since 1993, a small sample of mothers of infants who were not malformed in these 3 regions were included as potential control subjects. In addition, since 1998, a population-based sample of mothers of infants who were not malformed had been recruited from Massachusetts. Within 6 months of the delivery, trained study nurses interviewed mothers of malformed and infants who were not malformed. Interviews were conducted face-to-face (primarily in the woman's home) before 1998 and by telephone after that time. The interview included questions on demographic characteristics and a detailed history of the use of medications from 2 months before conception throughout the entire pregnancy; at the end of the interview, each woman was asked to describe any factors that might cause or prevent birth defects. Institutional review board approval was obtained from all participating institutions, and mothers provided informed consent before participation.

Trends in folic acid awareness and in periconceptional use of folic acid

This analysis involved all mothers (n = 16,555) from 1988 to 2002 (malformed subjects, 12,370; not malformed subjects, 4185; subjects included 14,724 live-born infants, 1298 abortions, 53 stillborn infants, and 470 neonatal deaths). During these years, participants were asked the following question at the end of the interview: "Have you heard of any vitamin or anything else that may decrease the risk of birth defects?" If the answer was yes, the following questions were asked: (a) "Can you name any vitamin in particular?" (b) "Can you name any birth defect in particular in relation to the vitamin mentioned?"

In this analysis, women were considered to be aware of folic acid if they volunteered that folic acid (or folate) could diminish the risk for birth defects. Because the interview took place up to 6 months after birth, women may have learned about folic acid during or after pregnancy. Women were considered to have used folic acid in the etiologically relevant period if they reported daily use of either a folic acid supplement alone or a folic acid–containing multivitamin from 2 months before pregnancy through the first trimester.

We calculated secular trends for both folic acid awareness and the use of folic acid in the relevant period among all women and according to educational level (low awareness, <12 years of education; middle awareness, 12-15 years of education; and high awareness, >15 years of education).

Sociodemographic predictors of awareness and the use of folic acid in the relevant period

For this analysis, we restricted data to the 7555 mothers that were ascertained between 1998 and 2002 (malformed subjects, 4445; not malformed subjects, 3110) because recent information has the greatest value for targeting future interventions. Determinants of interest were educational level, maternal age at the time of interview, ethnicity, parity, whether the pregnancy was wanted, whether the woman had consulted a health care provider in planning her pregnancy, marital status, family income, whether the baby had a birth defect, and whether the woman had knowledge on the relation between folic acid and birth defects.

We considered that women had "specific" knowledge of folic acid if they volunteered that folic acid protected against NTDs, spina bifida, or any abnormality in the brain (prevent NTDs) or other specific birth defects (prevents defects other than NTDs). Women who could not report any specific defect were considered as having "nonspecific" knowledge.