

Nutrition News for Africa

Abstract - January 2009

Effects of maternal multiple micronutrient supplementation on fetal growth: a double-blind randomized controlled trial in rural Burkina Faso.

Roberfroid D, Huybregts L, Lanou H, Henry MC, Meda N, Menten J, Kolsteren P. American Journal of Clinical Nutrition 88:1330-40, 2008.

Introduction

Low birth weight (birth weight <2500 g) is an important predictor of mortality and morbidity in the neonatal period. In developing countries, most cases of low birth weight are attributable to intrauterine growth restriction rather than preterm delivery. Although numerous factors affect fetal development, maternal malnutrition, including micronutrient deficiencies, is assumed to be a major determinant of intrauterine growth restriction. Thus, the study's objective was to evaluate whether providing a multiple micronutrient supplement during pregnancy, rather than iron and folic acid alone, increased fetal growth and affected other pregnancy outcomes.

Methods

The study was a double-blind, randomized, controlled efficacy trial among 1426 pregnant women in rural Burkina Faso. The women were randomly assigned to one of two groups. One group received g folic acid/day), as?iron-folic acid supplements (IFA; 60 mg iron/day, 400 currently recommended by the World Health Organization (WHO) (1). The other group received the UNICEF/WHO/UNU international multiple micronutrient preparation (UNIMMAP) that provides the Recommended Dietary Allowance of 15 vitamins and minerals. Supplements were provided daily from the first or second trimester until 3 months after delivery, and intake was directly observed.

Results and Conclusions

UNIMMAP significantly increased fetal growth as compared to the IFA supplement. After adjustment for gestational age, birth weight (52g; 95% confidence interval (CI): 4, 100; P=0.035), birth length (3.6 mm; 95% CI: 0.8, 6.3; P=0.012), arm circumference (1.2 mm; 95% CI: 0.2; 2.3; P=0.020) and chest circumference (2.8 mm; 95% CI 0.1, 5.6; P=0.041) were all significantly greater in the UNIMMAP group (the respective differences are shown in parentheses). However, these differences varied according to the percentiles of infant birth weight and length. Despite the significant overall difference in mean birth weight, there was no difference in the risk of low birth weight or being small-for-gestational-age between intervention groups. However, the risk of being large-for-gestational-age was higher in the UNIMMAP group (odds ratio (OR): 1.58; 95% CI: 1.04, 2.38; P=0.034). In other words, the effect of UNIMMAP on birth weight occurred primarily at the upper end of the birth weight distribution. Moreover, the effect of UNIMMAP was greater among mothers with higher body mass index (BMI) and among multiparous mothers (those who had delivered at least one other child previously).

There was no difference between groups in infant gestational age (i.e., duration of pregnancy). In total, 1044 (86.2%) infants were born at term, and the rate of preterm infants did not differ between groups. Unexpectedly, the risk of newborn perinatal death was marginally significantly increased in the UNIMMAP group (OR: 1.78; 95% CI 0.95, 3.32; P=0.07), and this seemed to occur mainly among infants of primiparous women (OR: 3.44; 95% CI:1.1, 10.7; P for interaction =0.11).

Because UNIMMAP provides half the amount of iron as does IFA (UNIMMAP: 30 mg iron/day; IFA: 60 mg iron/day), it could not be determined whether the treatment effects were due to the difference in iron content, the addition of other micronutrients, or the combination of the two factors. At present, it is also uncertain what impact the intervention had on the infants' postnatal growth and survival, although a follow up study is currently ongoing. A similar study in Indonesia found increased survival during infancy among those infants whose mothers received the UNIMMAP supplement (2).

Program and Policy Implications

In summary, the study in Burkina Faso found that maternal UNIMMAP was associated with increased birth size compared with standard IFA supplementation, although this effect seemed to be present only among higher birth weight infants and infants of multiparous mothers. The possible lack of benefit and potential harm in primiparous women should be further investigated through a systematic (pooled) analysis of already published studies. Thus, further analysis is required before specific public health recommendations can be formulated.

NA Editors' comments*

Based on the results of the study in Burkina Faso and the inconsistency of results from other similar studies, multiple micronutrient supplementation during pregnancy can not be recommended until further information is available. This conclusion is in an agreement with the findings of a recent meta-analysis on prenatal multiple micronutrient supplementation that found that there is insufficient evidence to suggest replacement of iron-folic acid supplementation with a multiple micronutrient supplement (3). The meta-analysis assessed the effects of multiple micronutrient supplementation versus several different comparison groups. When multiple micronutrient supplementation was compared with supplementation with one or two micronutrients or none or a placebo there was a significant reduction in the number of low birth weight and small-for-gestational-age babies and maternal anemia with multiple micronutrient supplements. However, when multiple micronutrient supplementation was compared with IFA there were no significant differences, either because IFA alone was equally beneficial or because the smaller number of available studies reduced the statistical power to detect such differences. Therefore, until further information becomes available, the iron-folic acid supplements should be provided to pregnant women, as recommended by WHO; and efforts should be devoted to increase access to prenatal care and assisted delivery for women in developing countries.

* Note that the comments have been added by the editorial team and are not part of the cited publication.

Reference

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2. Shankar AH, Jahari AB, Sebayang SK, et al. Effect of maternal multiple micronutrient supplementation on fetal loss and infant death in Indonesia: a double-blind cluster-randomised trial. *Lancet* 2008;371:215-27.
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