Prenatal Multiple Micronutrient Supplementation Has Better Effect on Birth Weight than Iron+Folic Acid Supplementation: A Randomized Controlled Blind Programmatic Study in Rural Niger

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Abstract

Back ground: Micronutrient deficiencies during pregnancy are associated with adverse pregnancy outcomes. We compared the impact on birth weight of UNICEF's multiple micronutrient supplement (MMN) to iron+folic Acid supplement (IFA) in pregnant women in the health district of Mayahi in Niger. Aims: The study aim was to compare the effects of MMN and IFA supplementation during pregnancy on birth weight. Methods: We recruited 3,670 pregnant women in their first trimester of pregnancy from 78 villages. Informed consent from all women and their husbands were obtained before recruitment. The villages were randomly assigned to receive either the UNICEF MMN (MMN-G) or the iron folate (IFA-G). Study subjects as well as health workers were blinded to the treatment. Study subjects received each month a sachet of 35 tablets of the supplements. Pill count was used to estimate adherence to the treatment. In addition to free distribution of supplement, all study subjects received a free prenatal consultation each month and malaria prevention/case management as part of the health regular prenatal package in the health district. Baseline data on maternal anthropometry, food consumption, workload, socio economic and health status were collected. During monthly follow up, data were collected by one enumerator and a matrone. Birth weight was measured using a calibrated Uniscale to the nearest 100 g immediately after delivery and no later than 72 hours. All events during the course of pregnancy were registered by the village enumerator in a register. Statistical analysis was performed using appropriate regression models. Results: Out of the 3,670 women enrolled in the study, 1,893 and 1,777 were respectively assigned to MMN-G and IFA-G. Of them, 2,902 delivered (1,521 in the MMN-G and 1,381 from the IFA-G). Of these, 2,550 were considered in the analysis after excluding stillbirth, incomplete data or unknown weighing times. Mean birth weight in the MMN-G (3,092 ± 190 g) was significantly higher (p<10-4) than in the IFA-G (3,025 ± 205 g). We found 7.2 ± 5.9% and 8.4 ± 8.9% low birth weight in MMN-G and IFA-G, respectively, but the difference was not statistically significant. LBW was significantly lower (p<10-4) in MMN-G only among women with low maternal pre-pregnancy BMI, or more than 150 days of supplementation (p<10-4). Conclusions: MMN supplementation during pregnancy induced a greater impact on birth weight than IFA. However, both supplements were effective in reducing low birth weight as part of a package of prenatal interventions for pregnant women. Our findings suggest the need to ensure effective micronutrient supplementation for pregnant women as part of a prenatal care package.

Background

Background Micronutrient deficiencies during pregnancy are associated with adverse pregnancy outcomes, including reduced birth weight. Low birth weight is associated with increased risk of infant mortality and growth failure. Iron + Folic acid supplementation for all pregnant women is part of the national policy, however poor health coverage and low access to health services do not allow proper application. Maternal anemia is still high and recent Demographic Health Statistic (2006) reported prevalence of anemia to be 44.5%.

Objectives

To compare the programmatic effectiveness of prenatal supplementation with UNIMMAP multi-micronutrient to that of iron/folic-acid on average birth weight and incidence of low birth weight.

Settings and Methods

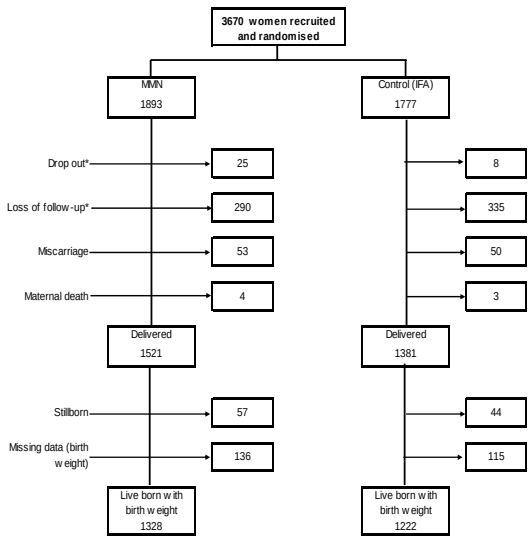
Settings: 78 villages in a health district with poor health indicators and low coverage, in the context of Niger 2005 nutrition crisis

Design and treatment: Programmatic, single bilnded, controlled effectiveness trial; 78 villages randomly assigned to 2 groups; Pregnant women from these villages recruited as earlier as possible (12 weeks) and enrolled after informed consent; Group 1: daily multiple micronutrient (14 nutrient including iron -30 mg- and folic acid 400 mcg); Group 2: daily usual iron (60 mg) + folic acid (400 mcg).

Interventions: Monthly delivery of supplement during the monthly prenatal visit; ongoing advices and data collection by one data collector and 2 traditional birth attendants per village; free malaria prevention, monthly prenatal visit, free case management; Nutrition communication

Data handling and analysis: Data cleaned and outliers excluded; Comparison of dropped out to remaining subject for selection bias; Cluster analysis to assess significant differences in adjusted mean birth weight and incidence of low birth weight, using regression model; Stratified analysis by mother BMI and duration of supplementation

Study subjects and profile



Results

Baseline characteristics of dropped out comparable to subjects who completed the study

Crude difference in mean birth weight: 67±14 g higher for Group 1
Adjusted difference in mean birth weight: 47 ± 15 g higher for Group 1
Crude difference in low birth weight: 1.2 ± 0.6% lower in Group 1
Adjusted difference in low birth weight: 0.6 ± 0.6% lower in Group 1

Table 1. Comparison of Mean birth weight and Low birth weight according to duration of observance and BMI

	Multiple Micron. Mean (SD)	Iron + Folic Acid Mean (SD)	Crude difference Mean (95% CI)	P-value 95%
Birth weight (g)				
•< 150 days	3060 (237)	3060 (237)	56 (31;82)	0.000
•> 150 days	3131 (187)	3053 (186)	78 (56;99)	0.000
•BMI < 18.5	3040 (238)	2985 (256)	55 (10;100)	0.016
•BMI > 18.5	3103 (196)	3035 (213)	68 (51;86)	0.000
Low Birth Weight (%)				
•< 150 days	10.0 (11.0)	9.8 (10.3)	0.2 (-0.9; 1.4)	0.664
•> 150 days	3.8 (6.1)	6.7 (10.4)	-2.9 (-3.9;-1.9)	0.000
•BMI < 18.5	6.3 (11.6)	11.1 (14.7)	-4.8 (-7.2;-2.4)	0.000
•BMI > 18.5	7.4 (6.5)	7.8 (8.9)	-0.4 (-1.0; 0.3)	0.279

Sample size: Multiple micronutrient: 39 (weighed: 1328) and Iron +Folic Acid: 38 weighed: 1222)

Conclusions

MMN supplementation during pregnancy induced a greater impact on birth weight than IFA. However, both supplements were effective in reducing low birth weight as part of a package of prenatal interventions for pregnant women. Our findings suggest the need to ensure effective micronutrient supplementation for pregnant women as part of a prenatal care package.