

Maternal & Infant Nutrition Briefs



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A research-based newsletter prepared by the University of California for professionals interested in maternal and infant nutrition



Iron and Pregnancy: Are Daily Supplements Really Needed?

Many women take iron supplements during pregnancy, because meeting their high needs for iron through diet alone is difficult. Carefully controlled clinical trials show that iron supplements can reduce anemia rates during pregnancy. Nevertheless, in the U.S. where prenatal iron supplementation is routine, more than 30% of low-income pregnant women are anemic during their last trimester. These data indicate that a large gap exists between what can be achieved in controlled conditions vs. actual practice (i.e., through the primary health care system). World-wide, the situation is similar. Program effectiveness in combating anemia is influenced by the cost and availability of iron supplements; access to prenatal care; the quality of counseling about the need for iron ; and the willingness of women to put up with the side-effects of iron supplements.

Pregnant women who take iron often complain of metallic taste, constipation or other gastrointestinal discomfort. These problems may be reduced by lowering the dose, using a slow-release preparation, or changing the frequency of taking iron. A number of studies are underway to determine whether taking iron less often can be as effective as taking iron daily in preventing anemia. The basis for these studies rests on the observation from animal studies that daily iron doses actually reduce iron absorption for several days due to mucosal blockage. Alternatively, if iron dosing coincides with the intestinal cell turnover every three days, absorption of iron improves. The first major trial of weekly vs. daily iron supplementation in pregnant women was recently published in the June issue of the American Journal of Clinical Nutrition.

The study was carried out among 139 pregnant women, who received care through six rural health centers in West Java. Women from three centers, randomly selected as treatment groups, took iron supplements one time per week (60 mg of iron plus 0.50 mg of folic acid, twice a day). Women from the other three centers were controls and took iron for daily (60

mg of iron plus 0.25 mg of folic acid, once per day). Compliance was determined by asking the women if they had taken all their pills and by performing a fecal iron test. Blood samples were analyzed for hemoglobin and serum ferritin levels at 8-24 weeks (baseline) and at 28-32 weeks, after supplementation for at least 8 weeks. Unfortunately, the scheme of randomization did not result in equivalent groups at base-line: controls had significantly higher hemoglobin levels than the treatment women (106 g/L vs. 102 g/L, $p = 0.01$).

By the end of the study, iron supplementation--daily or weekly--had successfully decreased the prevalence of anemia in both groups. Hemoglobin levels increased significantly (daily: 110 g/L; weekly: 108 g/L). However, serum ferritin levels, a measure of iron stores, did not change. Moreover, serum ferritin levels were significantly lower among the women taking iron weekly, compared to those taking iron daily (27.7 vs. 20.5 $\mu\text{g/L}$, $p = 0.001$). This difference was probably due to the initial differences in iron status between the groups. The authors were unable to find significant differences in compliance. The frequency of complaints about side effects was also similar between the groups.

The authors concluded that, under normal clinic conditions, iron taken once a week can be as effective as a daily dose of iron. However, women taking pills for more than 12 weeks were less likely to comply than those who took pills for less than 12 weeks. While a weekly dosing schedule would cut the cost of iron supplements, significant improvements in compliance may not occur. Before routinely changing the frequency of iron supplements, the effectiveness of weekly vs. daily iron supplements should be evaluated in different settings, particularly where iron is prescribed early during pregnancy.

Sources:

Yip, R. 1996. Iron supplementation during pregnancy: is it effective? *AJCN* 63:853-855.
Ridwan, E. W. Schultink, D. Dillon and R. Gross. 1996. Effects of weekly iron supplementation on pregnant Indonesian women are similar to those of daily supplementation. *AJCN* 63: 884-890.

Do Human Milk Fortifiers Improve Outcomes in Preterm Infants?

The way preterm infants are fed in the first few weeks of life can have a significant impact on their long-term development. Previous studies have found that preterm babies fed special preterm infant formulas have higher developmental scores at 18 months, compared to preemies fed standard infant formulas. Researchers have also shown that human milk is better tolerated by preemies and is associated with fewer cases of necrotizing enterocolitis, compared to formula. Earlier studies found higher IQ scores among children fed their mother's milk (vs. formula) as preterm infants. More recent studies indicate that even banked donor milk fed to preemies has been associated with improved psychomotor scores at 18 months, compared to standard formulas. However, to enhance growth and bone mineralization in preemies, human milk fortifiers are often used. The August issue of the *American Journal of Clinical Nutrition* includes the results of the first large-scale study undertaken to determine whether human milk fortifiers benefit preterm infants, in terms of growth, development, nutritional status, and morbidity.

The study was carried out in the United Kingdom among 275 preterm infants, with birth weights < 1850 gm, gestation < 37 weeks, and without major congenital anomalies. The infants, who all received breast milk, were randomly given either Enfamil human milk fortifier (fortified group) or a control supplement with only phosphorus and vitamins (control group). If the mothers could not express enough breast milk to feed their babies, preterm formula was also given, at the end of the 24 hour period. No formula was mixed with breast milk.

Breast milk intake averaged 47.6% of intake in the fortified group and 46.4%, in the controls. The infants were monitored carefully for clinical, biochemical, and anthropometric parameters until they reach 2000 gm in weight. At 9 and 18 months (corrected age), the researchers assessed infant development status using the Bayley mental and psychomotor tests and the Vineland test of social maturity.

The results indicate the human milk fortifiers provide some benefits to preterm infants but also have some potential drawbacks. While short-term growth rates were not different among the groups, weight gains among a subgroup of preemies receiving > 50% of their intake from breast milk were significantly higher in the fortified group than in controls. Plasma protein levels during weeks 3-4 and blood urea values after 2 weeks were higher in the fortified group, compared to controls, suggesting improved nutrient status. However, the fortified groups was also more likely to have plasma urea levels > 5 mmol/L compared to controls. Another area of concern was the higher incidence of systemic infection (confirmed or suspected) among the fortified groups, compared to controls. No significant differences were found in the occurrence of necrotizing enterocolitis, but the incidence in this study was relatively low compared to other studies. The plasma calcium, phosphorus, and alkaline phosphatase levels do not suggest that bone mineralization was better in the fortified group vs. controls. Finally, no significant differences were found between the groups in growth or development scores at 9 and 18 months, although the development scores tended to be higher in the fortified group.

The results of this study may lead one to conclude that human milk fortifiers do not provide much benefit to preemies. The higher incidence of infections suggests a need to monitor use of human milk fortifiers carefully. However, we need to keep in mind that many infants in this study were getting a substantial amount of preterm formula, which may have diluted the results. In a larger study with exclusively breast-fed infants, significant differences in developmental scores might be found. More research is needed to definitively determine which preemies should be given human milk fortifier and how the product can be modified to optimize benefits and reduce risks.

Sources:

Lucas, A., M.S. Fewtrell, R. Morley, P.J. Lucas, B.A. Baker, G. Lister, and N.J. Bishop. 1996. Randomized outcome trial of human milk fortification and developmental outcome in preterm infants. *AJCN* 64: 142-51.
Schanler, R.J. 1996. Human milk fortification for preterm infants. *AJCN* 63: 249-50.

Prenatal Weight Gains that Balance Infant and Maternal Needs

Some providers shy away from counseling young women with normal pregravid weights about avoiding excessive weight gains. In some cases, the client may take this advice too seriously and not gain enough weight. Yet, as the prevalence of overweight and obesity has increased in the U.S. during the past 10 years, we may need to think of ways to counsel pregnant women carefully so that the return to pregravid weight comes more easily.

Since minority women are at increased risk of becoming overweight, some researchers in Camden, New Jersey examined the relationships between prenatal weight gain, birth weight, and postpartum weight retention in 321 young, mostly African-American and Puerto-Rican women. All women had normal pregravid weight, defined by a body mass index (BMI) between 19.8-26.0 kg/m². Weight gains between 20-24, 24-28, 28-32, and 34-36 weeks were defined according to the Institute of Medicine ranges. Low rates of gain were < .75 lb/wk; moderate rates were .75-1.49 lb/wk; and excessive gains were > 1.5 lb/wk. Retained

postpartum weight was defined as the difference between postpartum weight and pregravid weight (taken by recall). Skinfolds (triceps, subscapular, and suprailliac) and body weights were measured at 4-6 wks. and 6 months postpartum. In examining the relationships between rate of gain and birth weight or retained weight, the authors controlled for confounding variables such as maternal age, parity, ethnicity, smoking, pregravid BMI, duration of gestation, history of preterm birth, and female sex of infant.

Infant birth weights were significantly lower among women who had low rates of gain compared to women with moderate or excessive gains. However, women who gained excessive amounts of weight did not have babies with higher birth weights than those with moderate gains. On the other hand, excessive weight gain was associated with increased risk of becoming overweight (Odds Ratio 2.98, 95% CI 1.36-6.00). Women with excessive gains retained more weight after pregnancy and had greater postpartum weights at 4-6 wk. and 6 months than women with low or moderate gains. None of the anthropometric measures differed among women with low or moderate weight gains. Lactation did not influence the results, but breast-feeding rates are probably low in this population.

In counseling young minority women about prenatal weight gain, providers can point out that while excessive gains can make postpartum weight loss more difficult, inadequate gains do not necessarily make weight loss later any easier. For normal weight women, the best course still appears to aim for moderate weight gains of .75 up to 1.5 lb per week.

Source:

Scholl, T.O., M.L. Hediger, J.I. Schall, I.G. Ances, and W.K. Smith. 1995. Gestational weight gain, pregnancy outcome, and postpartum weight retention. *Obstet. Gynecol.* 86: 423-7.

Risk Factors for Neural Tube Defects among Hispanics

Several studies have reported an increased risk of neural tube defects (NTD) among Hispanics. A case-control analysis with data from 1989-91 in Texas found some interesting results. Having a Hispanic parent was a strong risk factor for both anencephaly and spina bifida. The 2.5-fold greater risk was not explained by birthplace of the mother (U.S.- born are at same risk as Mexico-born Hispanics). Maternal diabetes was also not associated with the increased risk observed. Lack of prenatal care or late entry to care was associated with increased risk of anencephaly among nonHispanic whites but not Hispanics. Folic acid intake was not examined in the Texas study but in a California study, the relationship between folic acid and NTD was less marked for Hispanics compared to other ethnic groups. While genetic factors may be involved, another possibility for the apparently increased risks observed may be lower rates of screening, diagnosis, and NTD-related terminations among Hispanics, compared to nonHispanics. Given the increased risk of NTD in the Hispanic population, more research will be needed to identify the factors involved.

Source:

Canfield, M.A. J.F. Annegers, J.D. Brender, S.P. Cooper, F. Greenberg. 1996. Hispanic origin and neural tube defects in Houston/Harris County, Texas II Risk Factors. *Amer. Journal of Epidemiology* 143: 12-24.

Shaw, G.M., D. Schaffer, E.M. Velie, K. Morland, and J. A. Harris. 1995 Periconceptual vitamin use, dietary folate, and the occurrence of neural tube defects. *Epidemiology* 6: 219-226

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