

MICRONUTRIENTS SUPPLEMENTATION IN PREGNANCY AND NUTRITIONAL STATE IN NEWBORNS. COMPARISON BETWEEN SPANISH AND IMMIGRANT WOMEN

Francisco Javier Martín Almena

Universidad Autónoma de Madrid, Ciudad Universitaria de Cantoblanco 28049, Madrid, Spain

Abstract

Nutritional state in pregnant women has an important role in pregnancy course and birthweight. A suitable birth weight reduces neonatal mortality, stunting syndrome and future adulthood diseases as CVD, obesity, blood pressure levels or type 2 diabetes. The aim of this study is to verify if nutritional supplementation on pregnant women affects birth weight in 337 Spanish, Latin American and Moroccan women and their babies. Women at Hospital la Paz maternity unit in Madrid were interviewed following the Helsinki Protocol with questions regarding sociodemographic characteristics, diet and habits during pregnancy. It could be said that there isn't many differences in micronutrient supplementation patterns between nationalities but birth weights present important differences among them.

Key words: pregnancy, micronutrients supplementation, birth weight.

Introduction

Nutritional state in pregnant women has an important role in pregnancy course and birth weight. Pregnant women nutritional roles, previous and during pregnancy, are in charge of more than 50% cases of low birth weight (Ramakrishnan 2004, Poletti and Barrios 2001).

Birth weight is one of the best indicators for newborns health (Branca and Ferrari 2002, Ceesay et al. 1997, Li et al. 2003). In example, Ceesay et al. (1997) in a project in rural Gambia, found that perinatal mortality decreased 37% when birth weight increased because of better nutritional state during pregnancy course (Li et al. 2003).

In childhood, Stunting Syndrome or lineal growth decrease can slow down children growth (till 5 cm. height and 5 kg. weight; Shingal 2006), but it also produces a decrease in children development, immunological function failure, cognitive function decrease and it can alter metabolism to produce obesity or high blood pressure (Ceesay et al. 1997).

On the other hand, birth weight is an indicator of many diseases that could be developed at adulthood as cardiovascular diseases (CVD; Wells et al 2005), obesity (Gillman 2002), high blood pressure (Allen 2005) or type 2 diabetes (Allen 2005).

Many micronutrients deficiencies, as for example in folic acid, can contribute to abnormal prenatal development. Folic acid deficiency can cause spontaneous abortions, limited fetal growth, congenital malformations and neural tube defects (Ramakrishnan et al. 1999).

Iron is necessary to hemoglobin synthesis and other important functions to the organism. Anemic pregnant women will have many difficulties during childbirth. In addition, new borns will have incomplete iron reserves (Ramakrishnan et al. 1999).

Calcium deficiency affects bony development, neuromuscular activity and blood coagulation (Ramakrishnan et al. 1999).

As Keen and Zidenberg-Cherr said, there is sufficient evidence in their experiment to relate the use of vitamin-mineral supplements with a decrease of pregnancy difficulties and child birth defects (Poletti and Barrios 2001).

By all these reasons, the hypothesis of our study is that babies' birth weight whose mothers have ingested micronutrients supplements such as iron, folic acid, etc will be upper than babies' birth weight whose mothers haven't ingested them. Therefore, objectives are:

- To describe micronutrients supplements frequency during pregnancy.
- To analyze the relation between nationalities and birth weight.
- To analyze if there are different micronutrients supplementation patterns according to pregnant women nationality.

Design

Sample

The study was focuses on 337 Spanish, Moroccan and Latin American women who live in Comunidad Autónoma de Madrid and their children. The frequency of each nationality is shown in Figure 1.

Data gathering

Data were collected in Hospital la Paz maternity unit in Madrid (Spain). Mothers were interviewed following the Helsinki Protocol with questions regarding sociodemographic characteristics and diets and habits during pregnancy.

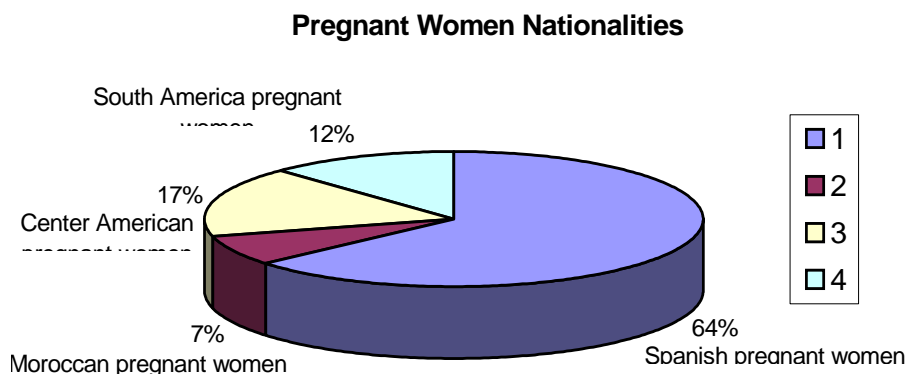


Figure 1: Pregnant women nationalities distribution.

Variables used

Variables used in this study are shown in Table 1.

Table 1. Variables used in the study.

In pregnant women	In newborns
Women nationalities	Gender
Micronutrients supplements doctor's prescription	Weight
Iron supplementation	
Folic acid supplementation	
Calcium supplementation	
Other micronutrients supplementation	

Study design

It is a cross-sectional study for pregnant women and newborns.

Data analysis

Data collected were used to create a database which was analyzed with SPSS 14.0 software and ANOVA was made.

Results

Micronutrients supplementation

95.8% of the women in sample had ingested some kind of micronutrients supplements.

By nationalities, Spanish women were the most supplemented women in sample with 96.3% of them, followed by South American pregnant women and Moroccan pregnant women who had ingested 95.5% and 94.7% respectively. Finally, Center American women were the least supplemented with 94.4% of them ingesting this kind of supplements (Table 2).

Table 2. Micronutrients supplementation frequency.

Nationality	Supplements not ingested	Supplements ingested
Spanish	3.7 %	96.3 %
Moroccan	5.3 %	94.7 %
Center American	5.6 %	94.4 %
South American	4.5 %	95.5 %
Total	4.2 %	95.8 %

Iron supplementation:

If we want to study micronutrients supplementation by each micronutrient, 83.7% of women in the sample ingested iron supplements.

By nationalities, Center American pregnant women were more supplemented in this micronutrient than the other women with 90.7% ingested them.

On the other hand, South American women were the least supplemented in iron supplements with 81.8% of them ingested them. Spanish women and South American women had similar ingestion of this micronutrient with 81.9% ingesting them.

Finally, 89.5% of Moroccan women ingested iron supplements during pregnancy (Table 3).

Table 3. Iron supplementation frequency.

Nationality	Iron supplements not ingested	Iron supplements ingested
Spanish	18.1 %	81.9 %
Moroccan	10.5 %	89.5 %
Center American	9.3 %	90.7 %
South American	18.2 %	81.8 %
Total	16.3 %	83.7 %

Folic acid supplementation

89.1% of women studied ingested folic acid supplements.

Spanish women were the most supplemented women in the sample. 92.1% of them ingested this micronutrient.

On the other hand, Moroccan women were the least supplemented women in this micronutrient with 78.9% ingesting them.

Finally, 81.5% of Center American women and 88.4% of South American women ingested folic acid supplements (Table 4).

Table 4. Folic acid supplementation frequency.

Nationality	Folic acid supplements not ingested	Folic acid supplements ingested
Spanish	7.9 %	92.1 %
Moroccan	21.1 %	78.9 %
Center American	18.5 %	81.5 %
South American	11.6 %	88.4 %
Total	10.9 %	89.1 %

Calcium supplementation

34.2% of women studied ingested calcium supplements.

Results show that 55.8% of Central American women ingested calcium supplements, compared to 36.8% of Moroccan women who ingested the same supplement.

Spanish women were the least supplemented women with 28.4% of them ingesting calcium supplements.

Finally, 34.9% of South American women ingested calcium supplements during pregnancy.

This study has significant evidence ($p < 0.05$) that verify the existence of prescription differences by nationalities (Table 5).

Table 5. Calcium supplementation frequency.

Nationality	Calcium supplements not ingested	Calcium supplements ingested
Spanish	71.6 %	28.4 %
Moroccan	63.2 %	36.8 %
Center American	44.2 %	55.8 %
South American	65.1 %	34.9 %
Total	65.8 %	34.2 %

Other micronutrients supplementation:

77.8% of women studied ingested other micronutrients supplements as for example iodine.

By nationalities, South American women were the most supplemented women in this kind of micronutrient with 83.3% of pregnant women ingesting them. Center American women were the less supplemented women with 50% of them ingesting this kind of supplements. 82.1% of Spanish women and 66.7% of Moroccan women had ingested other kind of micronutrients supplements.

This study has significant evidence ($p < 0.05$) that indicate the existence of prescription differences by nationalities (Table 6).

Table 6. Other micronutrients supplementation frequency.

Nationality	Other micronutrients supplements not ingested	Other micronutrients supplements ingested
Spanish	71.6 %	28.4 %
Moroccan	63.2 %	36.8 %
Center American	44.2 %	55.8 %
South American	65.1 %	34.9 %
Total	65.8 %	34.2 %

Birth weight

Among children, mean birth weight was 3173.12 g.

If we study the sample by nationalities, it could be seen that Center American women gave birth the biggest children with an average birth weight of 3296.31 g.

On the other hand, Moroccan women gave birth the smallest children with an average birth weight of 3081.58 g.

Finally, Spanish and South American women gave birth children which birth weight was 3140.84 g. and 3222.77 g. respectively (Table 7).

Table 7. Mean birth weight by mothers nationalities.

Mother nationality	Mean birth weight (grams)
Spanish	3140.84 ± 449.267
Moroccan	3081.58 ± 794.629
Center American	3296.31 ± 476.457
South American	3222.77 ± 520.528
Total	3173.12 ± 493.797

As usual, males were bigger than females in average birth weight, but Moroccan women gave birth bigger females than males with an average weight of 3092.00 g and 3074.14 g respectively.

The greatest difference between genders was observed in children whose mothers came from Central America, with about 140 g in difference between them.

Weight differences between genders in children whose mothers came from Spain and South America was about 100 g and 60 g respectively (Table 8).

Table 8. Mean birth weight by gender and mothers nationalities.

Gender	Mother nationality	Mean birth weight
Male	Spanish	3190.99±413.762
	Moroccan	3074.14±734.795
	Center American	3367.10±526.797
	South American	3260.00±547.682
	Total	3220.33±483.450
Female	Spanish	3096.66±475.625
	Moroccan	3092.00±913.002
	Center American	3223.17±414.372
	South American	3197.50±509.912
	Total	3130.54±500.371

Discussion

There has been observed different frequency in supplementation by nationalities and each kind of supplement.

It could be observed that in Central American women there were less micronutrients ingestion but they gave birth bigger babies. They were more supplemented in calcium and iron.

South American women were the second ones ingesting more micronutrients supplements and giving birth bigger children. They had the highest ingestion in other kind of micronutrients supplements and the lowest ingestion of iron supplements.

Moroccan women gave birth the smallest children and males are smaller than females. They were the least supplemented group in folic acid.

Spanish women tend to have smaller babies. They were the most supplemented group in the sample. They had the highest intake of folic acid and their intake of other micronutrients tends to be greater.

In conclusion, it could be said that there isn't many differences in micronutrient supplementation patterns between nationalities except in calcium and other micronutrients. Folic acid supplementation seems to have similar frequency in every group. Finally, we can observe important birth weight differences between nationalities.

Acknowledgements

I would like to thank Prof. Pilar Montero for her invaluable help.

References

- Allen LH, 2005. Multiple micronutrients in pregnancy and lactation: and overview. *Am J Clin Nutr*; 81(suppl): 1206S-1212S.
- Branca F, Ferrari M, 2002. Impact of micronutrient deficiencies on growth: the Stunting Syndrome. *Ann Nutr Metab*; 46(suppl 1): 8-17.
- Ceesay SM, Prentice AM, Cole TJ, Foord F, Poskitt EME, Weaver LT, Whitehead RG, 1997. Effects on birth weight and perinatal mortality of maternal dietary supplements in rural Gambia: 5 year randomised controlled trial. *BMJ*; 315: 786-790.
- Gillman MW, 2002. Epidemiological challenges in studying the fetal origins of adult chronic disease. *International Journal of Epidemiology*; 31: 294-299.
- Li H, Stein AD, Barnhart HX, Ramakrishnan U, Martorell R, 2003. Associations between prenatal and postnatal growth and adult body size and composition. *Am J Clin Nutr*; 77: 1498-1505.
- Poletti OH, Barrios L, 2001. Estudio de prevalencia de talla baja y factores de riesgos relacionados en escolares de Corrientes(Argentina). *An Esp Pediatr*; 55: 300-304.
- Ramakrishnan U, 2004. Nutrition and low birth weight: from research to practice. *Am J Clin Nutr*; 79: 17-21
- Keen CL, Zidenberg-Cherr S, 1994. Should vitamin-mineral supplements be recommended for all women with childbearing potential? *Am J Clin Nutr*; 59(suppl): 532S-539S.
- Ramakrishnan U, Manjrekar R, Rivera J, González-Cossío T, Martorell R, 1999. Micronutrients and pregnancy outcome: a review of the literature. *Nutrition Research*; 19: 103-159.
- Shingal A, 2006. Early nutrition and long-term cardiovascular health. *Nutrition Reviews*; 64: S44-S49.
- Wells JCK, Hallal PC, Wright A, Singhal A, Victora CG, 2005. Fetal, infant and childhood growth: relationships with body composition in Brazilian boys aged 9 years. *International Journal of Obesity*; 29: 1192-1198.

Mailing address:

Francisco Javier Martín Almena
Universidad Autónoma de Madrid
Ciudad Universitaria de Cantoblanco
28049 Madrid, Spain
francisco.javier.martin.almena@hotmail.com