Balanced Protein Energy Supplementation During Pregnancy for the prevention of IUGR

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Introduction
Public Health Importance

- Low birth weight is an ***important problem*** in public health,
- It is associated with increased neonatal mortality.
- 50% of the 3.9 millions neonatal deaths per year are due to babies born small either because of IUGR or preterm delivery.
- In developing countries LBW babies are more likely to be due to IUGR
- Among interventions tested for effectiveness in the prevention of IUGR, **protein energy supplementation** has been shown by randomized clinical trials as ***one of the most promising*.**

Objective

- To review the trials which have tested protein energy supplementation as a preventive strategy for IUGR

- To describe which are the public health implications of the results of those studies with emphasis on the reality in Egypt

Methodology

- Reports of randomized clinical trials included in the **Cochrane Library systematic review.** The systematic review included 13 studies. We have focused on the outcome SGA, which is a proxy for IUGR. In total, ***six trials*** reported this outcome.
- Data of LBW among Egyptian infants given by the **Egyptian National Perinatal Care Program** (ENPCP) taken from 80 neonatology units in different hospitals,
- Data given by the **Egyptian Demographic Health Survey** (EDHS) in 1995 and 2000
- Data of the **Ministry of Health and Population** (MOHP) in Egypt

Table 1: population characteristics

Author (year)	Country	Population	Intervention	Timing
Blackwell (1973)	Taiwan	182 women with marginal diets	40g protein , 800 kcal energy, vitamins, minerals control : vitamins and minerals	Prepregnancy and pregnancy
Ceesay (1997)	Gambia	2947 women with chronically marginal nutrition	22g protein, 1017kcal energy, 47mg calcium, 1.8mg iron control : no supplement	At 20 weeks gestation
Elwood (1981)	Wales	1153 adequately nourished pregnant women	Fat free milk Control : no supplementation	At time of first reporting pregnancy
Girija (1984)	India	20 poor women	30g protein, 417kcl energy control : unsupplemented diet	In last trimester
Mora (1978)	Colombia	339 undernourished poor women	38.4g protein, 865kcal energy control : unsupplemented diet	In the third trimester
Rush (1980)	USA	529 low income black women	6g protein, 322kcal energy, vitamins and minerals	Before 30 weeks

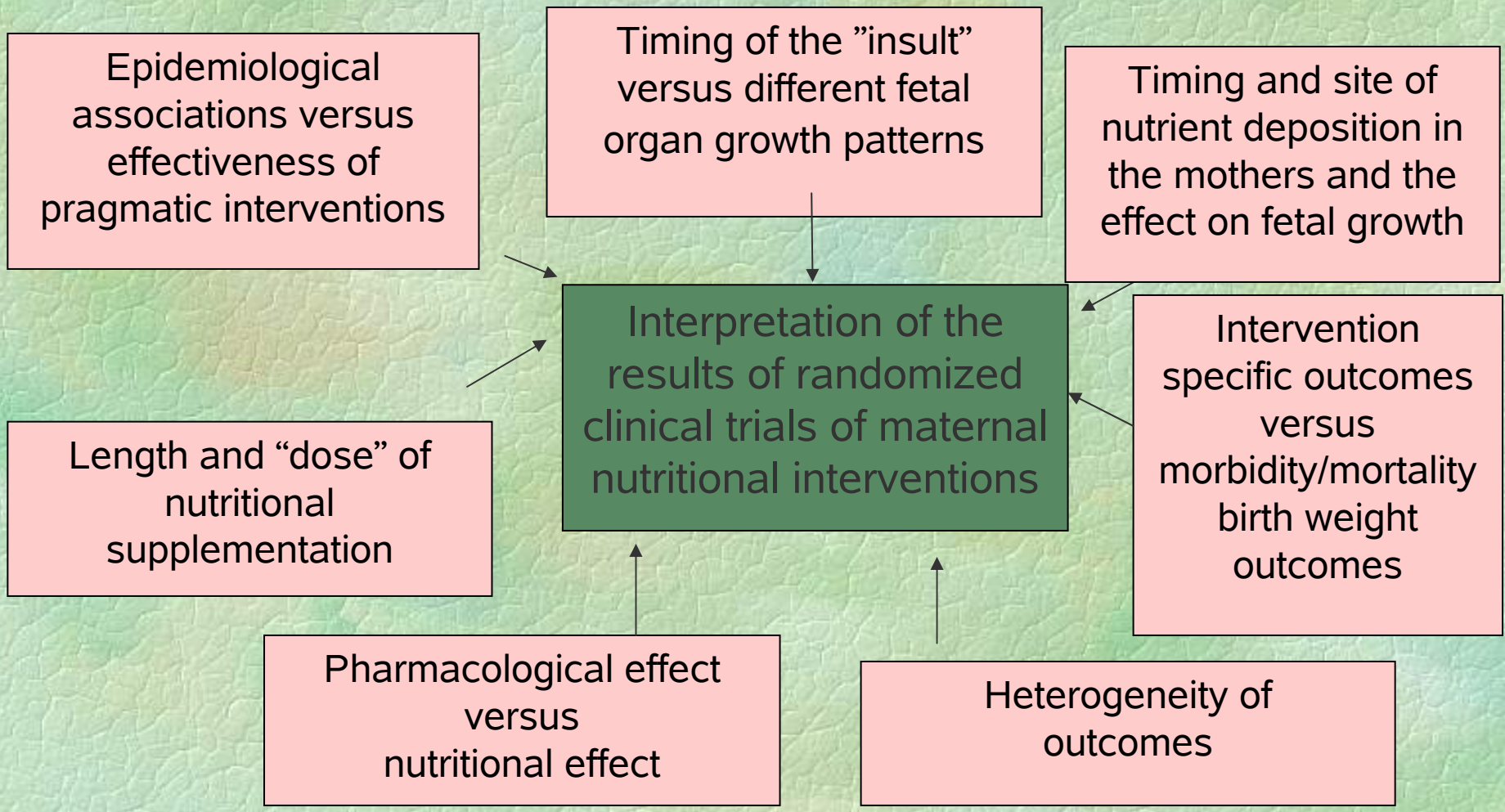
Table 2: Results

Study	Supplemented	Nb of SGA	Control	Nb of SGA	RR	CI
Blackwell (1973)	94	6	88	10	0.56	0.21-1.48
Ceesay (1997)	1010	112	1037	176	0.65	0.56-0.81
Elwood (1997)	591	25	562	27	0.88	0.52-1.50
Girija (1984)	10	0	10	5	0.09	0.01-1.45
Mora (1978)	177	12	162	14	0.78	0.37-1.65
Rush (1980)	265	30	264	43	0.70	0.45-1.07
Total (95% CI)	2147	185	2123	275	***0.68***	0.57-0.80

Protein Energy Supplementation appears to be a ***promising public health intervention*** for the prevention of IUGR

The results of this study show that ***protein energy supplementation*** decreases the risk of IUGR overall by ***30%*** which is a ***very important result*** for a **single** nutritional intervention.

Conceptual Framework



Epidemiological association versus effectiveness of programmatic intervention

- Results from observational studies are likely to be confounded by the effect of population characteristics
- Women from developing populations are more at risk of nutritional deficiencies and subsequently LBW outcome
- Intervention groups may be better and have better outcomes

Timing of the Insult and different fetal organ growth patterns:

- Fetal organs show differential growth patterns and contribute differently to total fetal volume at different gestational ages

- The effect of a nutritional deficiency or nutritional intervention on the growth of a fetal organ is likely to be related to the timing of the insult during gestation

Timing of Nutrient Deposition in the Mother and the Effect on Fetal Growth:

- Differential timing of nutrient deposition and its body location may also influence the fetus

- Birth weight is associated more with maternal changes in thigh skinfolds and early gestation fat gain than with other body sites or pregnancy times

Lenght and Amount of Nutritional Supplementation:

- It is unrealistic to assume that chronic undernutrition during two or three decades of life will be overcomed with only a few months of extra nutrient intake

- Energy supplementation was more effective on birth weight if it was provided for two consecutive pregnancies than during only one pregnancy

Pharmacological Effect versus Nutritional Effect:

- Nutrients can be provided to population with dietary deficiency ***(nutritional effect)*** or to population with adequate intake ***(pharmacological effect)***

- When protein energy supplementation was provided to population with adequate intake ***(Rush study),*** the result was an infant born with lower birth weight

Intervention-specific outcomes versus overall outcomes for fetal growth and birth weight:

- It is important to identify the most specific outcome in reference to protein energy malnutrition

- Birth weight may be too crude outcome to detect all possible effects of maternal nutritional supplementation

Heterogenicity of outcomes

- LBW and SGA include conditions with different aetiologies

- These outcomes may be too comprehensive to be significantly affected by a single nutritional intervention

Implications for practice:

- Balanced protein energy supplementation might be the ***only nutritional intervention*** for which a practical recommendation can be made

- When provided to women in areas with a high prevalence of maternal undernutrition , it can prevent impaired fetal growth.

Implications for research:

- Evaluating the effect of preconceptional, periconceptional and prenatal multiple micronutrients supplementation
- Study the mechanism of action of different nutrients on different organ growth and placental circulation.
- Follow up of infant to childhood and possibly adulthood
- Determine the biological importance of more specific outcomes of fetal growth, such as bone or soft tissue growth that can be assessed by ultrasonography.

These implications are particularly important for the reality of Egypt where ***50% of all LBW babies can be attributed to IUGR.***

Thus, nutritional supplementation interventions in this population is very likely to be effective in decreasing the incidence of LBW with its subsequent neonatal morbidity and mortality

Mortality rate due to VLBW(<1500g) reaches 56.5%, for LBW(<2500-1500g) is about 25.1%. and among normal birth weight neonates (>2500g) admitted to the neonatology units is about 12.5%. ***(ENPCP)***

These findings confirmed the need for prevention and early detection of IUGR, and of hospital care for both term and premature neonates ***(Mansour et al, 1998a, LBWSE, 2000).***

Thank You