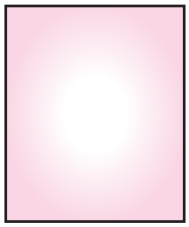
ISSUE 6

FIRST 1000 DAYS of Nutrition
Last a lifetime.

Multi-Micronutrient Therapy better than Iron, Folate, Calcium alone



Mother & Child, both ethical & professional responsibility of obstetricians

In obstetric practice, ethics are sometimes represented by polarized views, with one extreme asserting the rights of the fetus as the overwhelming ethical consideration, while another extreme asserting the pregnant woman as the overwhelming ethical consideration. However, both these assertions are overly simplistic, resulting in oversimplification and reductionism, and more importantly, conceptual and clinical failure.[1] In fact, obstetricians are at a unique position of not only providing care to the mother but also helping the fetus to get prepared for the future life. It is therefore a professional and ethical responsibility of the obstetricians to have a comprehensive outlook, and provide compassionate clinical care to both the pregnant woman and growing fetus. Being responsible obstetrician, one should strive to always get best clinical outcomes – both short- and long-term – of pregnancy in form of a healthy mother and a healthy child & future adult.

Maternal-fetal nutrition: A must for better pregnancy outcomes

Fetal health

In has now become clear that the intrauterine environment has a broad and long-lasting impact on the fetus, influencing the fetal & childhood growth and development, future cardiovascular health, non-communicable disease risk, and fertility.[2,3] Particularly, **the first 1000 days post conception are regarded as a sensitive window of time that can define the child's health, and in which the risk of later non-transmissible diseases can be modified.**[4] Hence, optimizing this intrauterine environment is a critical therapeutic target to ensure optimal outcomes. Herein, one of the most frequently discussed variable having an impact on this milieu is "maternal nutrition before and during pregnancy".[5]

A nutrient-rich diet - before and during pregnancy - is associated with[3,6]

- ✓ Improved fetal health
- ✓ More appropriate birth weight
- ✓ Improved organ development (reduced risk of congenital defects)
- ✓ Improved mental capacity
- ✓ Reduced vulnerability to infections
- ✓ Increased rates of survival.

In all, a healthy and balanced maternal nutrition can be a key to get better pregnancy and fetal outcomes in most cases. **Current guidelines also emphasize appropriate breast feeding and nutrition within the 1000 days from conception to a child's second birthday to optimize early development.**[7]

Maternal health

Concerning the health of the mother, a nutrient-rich diet containing prenatal vitamins, both before and during pregnancy, is considered to be associated with:

- ✓ Reduced risk of preterm delivery
- ✓ Reduced risk of preeclampsia
- ✓ Reduced risk of complications
- ✓ Improved maternal health.

Under-nourished mother gives birth to under-nourished child

While the association between maternal nutrition before and during pregnancy and the future health of the child now seems well-rooted; the consequently needed strategies to alleviate concerns resulting from any imbalance in this need and effect may not be so well-established especially in the developing countries owing to several barriers (Box 1).[8-10] This is a matter of significant concern seeing that **the cycle of undernutrition can be transmitted through generations as an undernourished female is more likely to have undernourished children.** The finding that South Asia hosts the largest proportion of undernourished children in the world could in fact be a reflection of this undernutrition during pregnancy.[11]

Diet alone is insufficient in improving maternal & fetal nutrition

Barriers to adequate nutrition during pregnancy

- ◊ Lifestyle
- ◊ Food aversions
- ◊ Lack of knowledge and counselling
- ◊ Cultural beliefs to feed carbs/fat rich diet

Source: Kavle JA, Landry M. Addressing barriers to maternal nutrition in low- and middle-income countries: A review of the evidence and programme implications. *Matern Child Nutr.* 2018;14(1):e12508.

Poor quality of ingredients

Pregnant women might be consuming high-calorie, high-fat meals that lack significant nutritional value. Low content or density of vitamins and minerals in food, or inadequate intake of vitamins and minerals are hence major contributors to micronutrients deficiencies.[12] **Pregnant women in India typically have diets characterized by low energy, macronutrient imbalance, and inadequate micronutrient intake.[13,14]** This micronutrients deficiencies (Hidden Hunger) can result in risk of several consequences for the mother and the child as discussed earlier.[15]

"Hidden hunger"

It is important to mention here that while stunting, wasting and underweight are the most common form of undernutrition in children; "hidden hunger" also known as deficiencies of essential vitamins and minerals, especially iron, zinc, iodine and vitamin A affects almost one-third of the world's population, making it a critical strategic target.[11] Many low- and middle-income countries have high prevalence of different forms of undernutrition along with micronutrientdeficiencies;[11] with pregnant women and children being the primary victims of this hidden hunger.[16]

Multi-Micronutrient supplement is better than Iron, Folate & Calcium alone

Given the limitations of diet in providing all essential micronutrients needed for the optimal health of the mother and growth of the developing child; extrinsic supplementation of these nutrients emerges as an effective care strategy. Essentially, to help optimize development and to fuel a healthy pregnancy, all essential nutrients should be included in the diet.[17] Table 1 depicts the estimates of different micronutrients' deficiencies in pregnant women in India, and different possible disorders associated with these deficienies.[12,18-26]

For decades, the World Health organization (WHO) has recommended provision of iron-folic acid (IFA) supplements as part of routine antenatal care, and, as a result, most countries include IFA consumption during pregnancy in their national nutrition plan.[27] However, with rising recognition of the value of multi-micronutrient (MMN) supplements as a safe and cost-effective intervention to reduce adverse pregnancy and birth outcomes; the recent 2020 WHO guidelines also recommended this intervention "in the context of rigorous research" as an update to the "not recommended" decision from the earlier 2016 guidelines, wherein daily use of IFA supplements was recommended. In fact, consumption of multiple micronutrient supplements during pregnancy have been shown to offer additional benefits compared with IFA supplementation.

Comparison studies of MMN & IFA

- A study from South-east Asia estimated the effects, costs, and cost-effectiveness of hypothetically replacing IFA supplements with MMN supplements for 1 year, and noted that replacing IFA with MMN supplements could avert over 15,000 deaths and 30,000 cases of preterm birth annually.[27,28]
- A follow-up study of the Supplementation with Multiple Micronutrients Intervention Trial (SUMMIT), a double-blind, cluster-randomised trial of maternal supplementation with MMN or IFA, showed that maternal MMN had long-term benefits for child cognitive development at 9-12 years of age, thereby supporting its role in early childhood development, and policy change toward MMN.[29]

Table 1: Deficiency of different micronutrients		
Micronutrients	**Estimates of deficiency in pregnant women in India**	**Deficiency disorders**
Iron	71.88%	Iron deficiency anemia, reduced learning and work capacity, increased maternal and infant mortality, low birth weight, impaired human function at all stages of life
Iodine	37%	Cretinism, goiter, impaired cognitive function, increased prenatal morbidity and mortality, reduced productivity
Zinc	59.34%	Poor pregnancy outcome, impaired growth (stunting), genetic disorders, decreased resistance to infections
Folate	76.97%	Neural tube and other birth defects, megaloblastic anemia, heart disease, stroke, impaired cognitive function, depression
Vitamin A	60.52%	Xerophthalmia (night blindness, Bitot's spot, corneal ulcer, keratomalacia, xerosis), increased risk of morbidity and mortality, increased risk of anemia
Vitamin D	93.5%	Rickets, osteomalacia, osteoporosis, colorectal cancer
Vitamin E	98%	Ataxia, peripheral neuropathy, muscle weakness, miscarriages, slow growth in children
Vitamin C	65.8%	Scurvy (fatigue, hemorrhages, low resistance to infections, anemia)
Vitamin B1	38.2%	Beriberi (cardiac and neurologic), Wernicke, and Korsakov syndromes (alcoholic confusion and paralysis)
Vitamin B3	58.97%	Pellagra (dermatitis, diarrhea, dementia, death)
Vitamin B6	10.4%	Dermatitis, neurological disorders, convulsions, anemia, elevated plasma homocysteine
Vitamin B12	48.5%	Megaloblastic anemia (associated with *Helicobacter pylori* induced gastric atrophy)
Calcium	58.67%	Decreased bone mineralization, rickets, osteoporosis

Source: Bhandari S, Banjara MR. Micronutrients Deficiency, a Hidden Hunger in Nepal: Prevalence, Causes, Consequences, and Solutions. *Int Sch Res Notices.* 2015;2015:276469.

- A Cochrane systemic review on MMN supplementation for women during pregnancy also suggested a positive impact of MMN supplementation with iron and folic acid on several birth outcomes; findings which may provide some basis to guide the replacement of IFA supplements with MMN supplements for pregnant women residing in low- and middle-income countries[30].

Conclusion

- Deficiencies of essential vitamins and minerals affects 50% of India's pregnant population.
- Nutrition within the first 1000 days from conception to a child's second birthday plays a critical role in early development.
- Emerging data on benefits of MMN supplements on birth outcomes calls for replacement of IFC supplements with MMN supplements.

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