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Lactating mother: Mapping nutrient intake

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Abstract
Nutrient requirements are considerably elevated during lactation than in any other stage of a woman's reproductive life. Women who are breastfeeding should increase their energy and nutrient intake to levels above those of non-pregnant, non-lactating women. The requirement are greater than during the pregnancy period, since breast milk to supply an adequate amount of all the nutrients for an infant's needs for growth and development. By four months after birth, an infant doubles the birth weight accumulated during the nine-month pregnancy period. The milk secreted in one month represents more energy than the total cost of a pregnancy.

Keywords: energy, nutrient, non-pregnant-non lactating women

Introduction
Maternal under-nutrition is associated with low birth weight and all its attendant adverse consequences. Epidemiological studies from India documented the magnitude and adverse consequences of chronic iron deficiency on the mother and paved way for effective intervention programmes to address under-nutrition during lactation. Over 75% of lactating women in India are anaemic and anaemia remains to be a major factor responsible for maternal morbidity and mortality. While under-nutrition continues to be major problem as in the earlier decades, the current decade has witnessed the progressive rise of over nutrition in women during reproductive age especially among the affluent segments of population both in urban and in rural areas [1].

Maternal nutrition is very important for the course and outcome of pregnancy. Successful pregnancy and lactation require adjustments in maternal body composition, metabolism and function of various physiological systems. A diet that meets maternal nutritional needs is required for these adjustments, so that maternal well-being is safeguarded with birth of a healthy infant. A balanced and adequate diet, therefore is of utmost importance during pregnancy and lactation to meet the increased needs of the mother, and to prevent nutritional stresses [2].

Actually nutrient requirements are considerably elevated during lactation than in any other stage of a woman‘s reproductive life. Women who are breastfeeding should increase their energy and nutrient intakes to levels above those of non-pregnant, non-lactating women [3]. The requirements are greater than during the pregnancy period, since breast milk has to supply an adequate amount of all the nutrients for an infant‘s needs for growth and development. By four months after birth, an infant doubles the birth weight accumulated during the nine-month pregnancy period. The milk secreted in one month represents more energy than the total cost of a pregnancy [4].

The energy balance equation has two components or determinants, i.e. energy intake and energy expenditure. The energy cost of lactation is determined by the amount of milk that is produced and secreted, its energy content, and the efficiency with which dietary energy is converted to milk energy [5]. This energy comes from the mother‘s diet and from reserves in tissues built up during gestation.

Carbohydrates provide a readily available source of energy to the body and are present in nearly all foods that have calories, except fats and oils. The three major types of dietary carbohydrate are starch, sugar and fibre. Many people regard starch and sugar as fattening and therefore to be avoided. Refined sugar is commonly blamed to cause Attention Deficit Disorder (ADD) and fibre is known as something to consume to avoid constipation [6].

Protein is a dietary essential that performs many functions in the body, i.e. structural components of body tissues (muscles, cartilage, and bones), enzymes, hormones, components of the immune system, transporters of other substances, membrane bound carriers and regulators of many biochemical processes. The primary role of dietary protein is to supply amino acids for biosynthesis, but it can be used for energy. Adequate protein intake is particularly important during periods of growth or recovery from disease [7]. Protein needs are greater for women during lactation compared to non-pregnancy. The protein content in breast milk appears to be influenced very little by maternal diet and is more affected by the age of the infant. Proteins are synthesized in the breast based on gene expression, which is influenced by changing hormone levels in the weeks and months after delivery [8].

The total fat content of breast milk remains consistent independently of the mother's diet. However, the types of fatty acids present in breast milk are influenced by maternal diet and energy balance. A woman with a diet high in monounsaturated fatty acids would have a large amount of this type of fatty acid reflected in her breast milk.

Nutrients are mobilized from maternal stores to produce breast milk, and the lactating woman is vulnerable to depletion of her nutrient stores. She should be encouraged to consume foods high in calcium, vitamins A, B1 (thiamin), B2 (riboflavin), vitamin B6, B12, folate, and iodine to minimize losses and to maintain her health and well-being.

Pregnancy and lactation are states known to be accompanied by physiologically up-regulated bone absorption in response to the calcium demands of the developing foetus and nursing infant. Calcium's role in the body is to assist with blood clotting, muscle contraction, nerve transmission, and the formation of bone and teeth. Calcium is mobilized from the bone during lactation and then replenished later. The calcium content of breast milk is maintained at the expense of maternal stores, and does not appear to be affected by the woman's serum calcium levels or dietary intake and supplementation. Women experience temporary acute bone mineral loss during lactation, only to have bone density restored to normal or above baseline after weaning. During lactation, alterations in metabolism, absorption, and excretion appear to help preserve maternal calcium stores [9].

Heme iron needs to be hydrolyzed from the globin portion of hemoglobin or myoglobin before absorption. Proteases in the stomach and the small intestine helps in the release of heme iron from globin. Heme iron is absorbed across the brush border of the enterocyte by heme carrier protein 1 found in the proximal small intestine. Within the mucosal cell, the absorbed heme porphyrin ring is hydrolysed by heme oxygenase into inorganic ferrous iron and protoporphyrin. The released iron then gets associated with proteins such as mobilferrin and can be used by the intestinal mucosal cell or used by other body tissues, following transport out of the enterocyte [10].

Zinc is an essential mineral found in almost every cell. It stimulates the activity of approximately 100 enzymes, which are substances that promote biochemical reactions in the body. It is beneficial for growth, maintenance of the immune function which enhances prevention and recovery from infectious diseases, maintains sense of taste and smell, and is needed for DNA synthesis.

The vitamin A content of breast milk is influenced to a greater extent by maternal dietary intake than by the woman's vitamin A status. Infants are born with relatively small amounts of stored Vitamin A in the liver and rely heavily on intake from breast milk or other dietary sources. Actually infant liver stores of vitamin A at birth are very small even in well-nourished populations. They greatly depend on the dietary intake of the mother. On the other hand, although vitamin A in human milk decreases over the course of lactation, breast milk is a good source of vitamin A and clinical vitamin A deficiency is rare in breastfed infants during their first year of life, even in poor populations. Therefore, if mother does not consume vitamin A in her diet, she will be depleted together with her child [11].

Vitamin A is essential for vision acuity, maintaining mucosal surfaces of the respiratory, gastrointestinal, and genitourinary tracts and for differentiation of immune system cells, however excess preformed vitamin A exerts teratogenic effects. The recommended dietary allowance in lactation is 850µg/day which gives a normal retinol concentration in breast milk of 485µg/litre. Deficiency is caused by a habitual diet that provides too little bio-available vitamin A to meet physiological needs.

Vitamin A from animal foods such as dairy products, liver, eggs is preformed and the most bio-available dietary source, but that from plants, such as orange and green leafy vegetables, is in the form of pro-vitamin and has to be converted before absorption. Deficiency is common since a number of factors influence its conversion, and animal sources are expensive for resource poor households. Thiamin plays an important role as a coenzyme in the metabolism of carbohydrates and branched-chain amino acids. Breastfed infants of women with beriberi, the thiamin deficiency disease, consequently develop infantile beriberi by three to four weeks of age. In thiamin-deficient women, supplementation will increase levels in breast milk to a certain limit, while excess is excreted in the urine [12].

In fact, it was not an astonishing matter to find that more than half of the interviewed women (about 63.25%) were not aware or had a little awareness about the danger of anaemia due to that fact that the majority (about 75%) of these women was either illiterate or had a primary or secondary education as described before. In fact, interaction between influencing factors should be investigated in more details. Awareness in this context indicated to the state and the ability to perceive the danger of anaemia and its negative consequences during and after pregnancy. The only way to realize the dangers of anaemia would be throughout better awareness either during education or by increasing this knowledge by organized campaigns. Maternal education level therefore influences the food choices and feeding patterns of family members. Majority of the women in this study had attained only primary level education. Marital status has been reported to influence lactation outcome.

Actually, it was unusual to notice that even women having adequate diet were also suffering from anaemia which could be attributed to some other interacted factors. In general, poverty has a negative effect on the consumption of nutritious types of food. Women in households with a low standard of living are less likely than other women to eat various foods, and their diet is particularly deficient in fundamental element [13]. It was foreseen that women residing in urban areas should be less likely for substantial anaemia conditions than women residing in rural areas because they have access to every type of food in their diet, particularly nutritious foods, and access to more advanced public and private clinics. The dietary intake of rural lactating women was lower than the recommended level. Because anaemia usually results from a nutritional deficiency of iron, folate, vitamin B12, or some

other nutrients, it is quite vital to look after of the women's diet especially during lactation. The consumption of a wide variety of nutritious foods is important for women's health [14].

To sum up, in this study, the prevalence of anaemia among pregnant women was investigated under the influence of some nutritional and socio-economic factors. The health services is available and accessible in general, but a major constraint is that the people could not afford to utilise it, because of the quality of the service, delivered there is poor quality awareness of women about the health services. The prevalence was higher in poorly educated women, women with large family size, and those who do not use family planning services. The study revealed that the prevalence of anaemia was the same among women who attend clinical units and using iron supplementation and women who do not attend or use iron supplementation. These findings strongly raise the issue of the awareness of mothers towards their health and family. More studies are needed to explore the causes of the failure to prevent anaemia among pregnant women. It is recommended to redistribute the health services according to needs of the population, to train clinical providers to deliver services up to the standard of the guidelines recommended by the World Health Organization, to increase the awareness of midwives regarding diagnosis, treatment and referral system of anaemia cases, to implement advocacy programmes to increase the utilization of family planning services, and iron supplementation in reproductive age and to revitalize the cooperation and coordination between school health and health education departments to raise the awareness of women in reproductive age, particularly girls in secondary schools for better anaemia prevention.

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