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Importance of nutrition in lactating mothers in terms of both the mother's and the infant's health

Mukadder Ayşe Selimoğlu
İnönü University Medical Faculty, Department of Pediatrics, Malatya, Turkey

Summary
A balanced diet for lactating mothers is essential for providing physiological needs of the mother and for the health of the infant via ideal breastmilk content. Nutrient profile of breastmilk is minimally affected by the mother's diet by giving priority to protection of infant; protein, fat, carbohydrates and folate are sufficient in breastmilk even if they lack in the mother's diet. However, this may be harmful for mothers because of consequent shortage of nutrient storages. On the other hand, some nutrients such as vitamin A, thiamin, and riboflavin are dependent on the diet of the mother; if they are insufficient in the mother's diet, so are they in breastmilk and in the infant. Micronutrient insufficiency is an important health problem in Turkish mothers. In that context, the importance of a balanced diet in lactating mothers for both their own healths and ideal breastmilk content should be emphasized. Making projects about this issue should be a priority for countries where micronutrient insufficiency is frequent. *(Turk Arch Ped 2013; 48: 183-187)*

Key words: Breastmilk, infant, nursing mother, nutrition

Introduction

A balanced diet for lactating mothers is essential for providing physiological needs of the mother and for balancing the nutritional reserve and for healthy growth and development of the infant via ideal breastmilk amount and content. During this period when the highest nutritional requirements are experienced, the organism of the mother is equipped with accommodation mechanisms to protect both her own health and the infant's health. Due to these accommodations the deficiency in the mother's diet is reflected at the lowest level in the infant. It is sure that each accommodation has its limits and therefore nutritional deficiencies may lead to problems in the infant in the short-term or long-term. In this balance, the loser is primarily the mother. Only if the mother has malnutrition or if there is an adolescent pregnancy which has a nonignorable frequency (5,9%) in our country, the nutrients are used in the mother and the infant may be harmed (1,2,3).

The favorable effects of breastmilk on the health of infants and adults is being understood better every passing day. Therefore, community-scale efforts should be made for a more successful breastfeeding period. The health of the infant achieved by increasing the amount of breastmilk and a more ideal breastmilk content are emphasized, but the health of the mother is ignored.

The effect of the mother's diet on the amount of breastmilk

It is known that nutrition of the mother with a non-ideal and even a poor diet does not interfere with breastfeeding (4). If the mother does not have a severe malnutrition, the effect of the nutritional status on the amount of breastmilk is negligible (2). Excessive energy is needed for the nursing mother to produce milk. To provide this excessive energy, generally the amount of eating of the mother is increased, but even if it is not increased, sufficient milk can be produced (5). In this case, the fat stores of the mother are used as energy source and the mother loses weight. In

Address for Correspondence: Mukadder Ayşe Selimoğlu MD, İnönü University Medical Faculty, Department of Pediatrics, Malatya, Turkey
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healthy mothers, 800 g/month weight loss is observed in the first 6 months after delivery. In mothers with malnutrition, 100 g/month weight loss is observed (6). It is not healthy to lose more than 2 kg/month during the lactation period (2).

The amount of energy taken and the amount of milk produced are not directly related. The amount of breastmilk shows sufficient sucking of the infant rather than the milk production capacity of the mother. Thus, if the nursing technique is accurate and the infant is sucking in a healthy and willing way, the milk production is sufficient (7,8). Except for excessive limitation of energy, the energy amount of the diet does not affect the amount of breastmilk (4). The amount of breastmilk in mothers with malnutrition may be lower. This may be related with the amount of energy taken or insufficient sucking of the low birth weight infant (4). Studies show that the amount of milk decreases, if the daily energy intake of the mother is lower than 1800 kcal (9).

It was shown that energy support did not increase the amount of breastmilk, but mothers with malnutrition could maintain their stores and nurse longer when supplements were given (2,10,11).

The effects of the mother's diet on the content of breastmilk and on the mother

Energy:

There are studies which have shown that the content of breastmilk (density) is related with the body structure of the mother or weigth gain during pregnancy (12,13,14). Restrictive diets lead to a decrease in the energy intensity in breastmilk especially in mothers with malnutrition, but changing the amount of energy in the diet does not lead to a change in the content of breastmilk in mothers with a normal body weight (2).

The amount of excess energy required by a nursing mother is approximately 750 kcal/day. The mother meets 500 calories of this from her diet and the remaining 250 calories are met from the fat stores gained during pregnancy. Thus, the mother can lose 5 kg in 6 months after delivery. However, it is not recommended that nursing mothers lose weight in a short time (>0.5 kg/week) (2).

Protein:

The effect of low-protein diet on breastmilk in nursing mothers is not clear. There are publications reporting that the protein content of breastmilk in mothers with malnutrition is not low or not different from normal (2,4). There are also publications indicating that protein support leads to a small increase in the protein amount of breastmilk, does not lead to any change or increases the amount of breastmilk without affecting the content (2,4,15,16). Protein requirement is high in nursing mothers. One should be more careful in vegetarian mothers.

Fat:

Long chain fatty acids (LCPUFA) are essential nutrients for development of the normal brain development in infants. The factors which affect LCPUFA synthesis in the mother include intake of trans fatty acids, deficiency of iron, magnesium, zinc, calcium, riboflavin, vitamin B6 and B12 and protein-poor and sucrose-rich diets (2). Thus, the mother should eat healthyly and deficiencies of vitamins and minerals should be absent for an ideal LCPUFA status.

It is known that fat intake in nursing mothers may change the content of breastmilk (2,4). The proportion of fat in breastmilk is related with the body structure of the mother and weight gain and diet intake during pregnancy. With very-low-fat diets the proportion of fat in breastmilk decreases, but the infant can take sufficient energy from breastmilk, if he/she sucks adequately (2). In addition, the deficit can be closed by synthesis of medium-chain-fatty acids in the breast, if the mother has adequate energy intake despite low-fat diet. If both energy and fat intake is low, the composition of fatty acids in breastmilk reflects the fat stores of the mother (17).

In the breastmilk of vegetarian mothers, the level of lineloic acid is higher and the level of docosahexaenoic acid (DHA) is lower. The level of DHA is higher in the breastmilk of mothers who consume fish (18). Sine a significant amount of LCPUFA is transferred to the breastmilk, nursing mothers' requirement is high (2).

Minerals and vitamins:

In a nursing mother with iron deficiency, the risk for disease is increased and the success of nursing may be decreased because of reasons including weakness and fatigue. Iron requirement which is increased during lactation in healthy mothers is compensated by lack of mensturation and increased absorption during lactation. The factors which lead to development of iron deficiency during lactation include iron status before pregnancy, hemorrhage after delivery, vegetarianism, low-vitamin C diet, excessive tea consumption, frequent pregnancies, early pregnancy and low socioeconomical status (2,4).

The amount of calcium in breastmilk is determined by increased bone absorption and not by the amount in the mother's diet (19). It was shown that the content of breastmilk and bone mineralization of the infant did not change in mothers who were given calcium supplements (19). Thus, the amount of calcium in breastmilk is independent of the diet. Estrogen which decreases during lactation provides sufficient calcium by increasing bone absorption. Since the highest bone mass is achieved at the age of 18-20 years, the requirement in adolescent mothers is higher (2).

The requirement of zinc is increased during lactation. Zinc which is released because of reduced uterus and reduced blood supply supports the stores in the mother

in the first month of lactation (20). It has been reported that external zinc supplements do not change the amount in breastmilk and the amount of zinc in breastmilk is not affected by low intake (21).

Magnesium is an essential mineral for energy production and bone tissue. The amount in breastmilk is not affected by the diet and there is no evidence that the requirement is increased during lactation (2).

Iodine is essential for thyroid metabolism. The amount in earth and soil affects the amount in the diet. The requirement increases during lactation and the amount in breastmilk is directly related with the intake of the mother. The amount in breastmilk is decreased in areas of iodine deficiency (2,4).

The requirement for vitamin A in nursing mothers is increased and the amount in breastmilk is affected by the diet. When there is deficiecy in the mother, the infant is affected directly (2). The level of vitamin A is lower in low-income families in developing countries compared to families in developed countries. Vitamin A supplements in these mothers increase the level in breastmilk (22).

The group of mothers and thus infants carrying a risk in terms of vitamin D deficiency is constituted of mothers who are dependent to home, dark-skinned and veiled and their infants and the uneducated group with a lower socioeconomical status. Normally, the requirement in pregnancy and lactation is not different from other periods (2).

During lactation, 4 mg vitamin E is trasferred to breastmilk daily; this is the increase in the requirement (2).

Increasing vitamin K in the mother's diet does not protect the infant from hemorrhagic disease (2).

The requirement of folic acid is increased during lactation. When there is deficiency of folic acid, the amount in breastmilk is maintained, but the mother is harmed (2).

During lactation, the requirement of thiamin is increased. The amount in breastmilk reflects the intake in the diet. Similarly, the amounts of riboflavin, niacin and vitamin B6 reflect intake. Riboflavin deficiency may be observed especially in individuals who do not consume milk. Infants are dependent on the diet of the mother in terms of vitamin B12 and one should pay special attention to vegetarian mothers (2).

Vitamin C in breastmilk is also affected by the diet of the mother (2).

The nutritional status of mothers in Turkey

According to the Turkey Demographic and Health surveys (2008) 1.8 % of our women were found to have malnutrition (BMI<18.5), 34.3% were found to be overweight (BMI = 25-30) and 22.7% were found to be obese (BMI>30) when evaluated in terms of body mass index (BMI) (3). Thus, energy deficiency is not a significant problem in Turkish women.

Although protein consumption per capita seems to be adequate in our country, it is observed that its distribution is problematic (rural and urban) and intake of animal protein is low (23). Similarly, intake of calcium, vitamin A and riboflavin is lower than the recommended levels (23).

In studies conducted with adolescents, deficiency was considered as a level lower than 67% of the daily recommended amount and it was shown that energy was consumed lower by 20-43%, protein was consumed lower by 8-24%, vitamin A was consumed lower by 32-59%, riboflavin was consumed lower by 30-70%, iron was consumed lower by 28-70% and calcium was consumed lower by 16-39% (23). According to population cencus statistics 5.9% of the deliveries in 2001 were constituted of adolescent pregnancies (15-19 years) (3). This creates the concern that micronutrient deficiencies during this period would be more exaggerated in terms of both the infant and the mother.

In studies conducted with pregnant women, it was shown that intake of energy, calcium, iron, zinc, vitamin A, tiamin and riboflavin was lower than 67% of the recommended daily intake (23). When the prenatal and postnatal periods were evaluated, it was reported that nutrients were taken deficiently except for energy, protein and vitamin E and C (23).

In a study conducted with nursing mothers, it was shown that mothers were at risk of iron deficiency (39%), riboflavin deficiency (43%), vitamin B6 deficiency (36%), vitamin B12 (60%) and folic acid deficiency (73%) (23).

It is known that 50% of pregnant and nursing mothers in Turkey have iron deficiency (23,24,25). In a study performed in 823 pregnant women in the province of Malatya in 2010, the frequency of anemia was found to be 27%. Iron deficiency was found in 50% of these, vitamin B12 deficiency was found in 35% and folate deficiency was found in 72% (26).

In a study performed in Manisa and İzmir in 2008 (27), vitamin A and E deficiencies were not found in mothers living in these provinces, but plasma vitamin A level was found to be low in 46% of pregnant women living in Gaziantep and vitamin A deficiency was found in 17% of the subjects(28). Especially, emphasizing the decrease in vitamin A in the last three months suggests that the risk of vitamin A deficiency will increase during lactation.

In different studies, severe vitamin D deficiency was found with a rate of 10-27%, moderate vitamin D deficiency was found with a rate of 40-54% and mild vitamin D deficiency was found with a rate of 40% in pregnancy (29,30). The more unpleasant finding was that the rate of deficiency in the control group who were not pregnant was also high (severe deficiency 27%, moderate deficiency 45%) (29). In another study, severe vitamin D deficiency was found in the last three months of pregnancy in 46% of pregnant Turkish women (31).

In a study, vitamin D deficiency was found with rates of 40%, 60% and 100% in our women who were open, moderately veiled and completely veiled women, respectively (32). In a study conducted with adolescents, vitamin D inadequacy was found with a rate of 44% and vitamin D deficiency was found with a rate of 21% (33). Vitamin D deficiency was found in half of adolescent girls who were veiled and living in a city (33).

Conclusions

Nutrition of nursing mothers is special. It is very significant in terms of both the mother's own health and the infant's health. The nutritional content of the mother is affected by diet with a low rate bringing protection of the infant to forefront. Even if the diet of the mother is poor in terms of protein, fat, carbonhydrate and folate, the amounts in breastmilk stay adequate (34). However, this state which does not affect the infant leads to deficiency in the mother's stores and consequently harms the mother. The levels of vitamin A and B in breastmilk are dependent to the mother's diet. If they are deficient in the mother, deficiency also develops in the infant. Studies performed in Turkey show that micronutrient deficiency in mothers in Turkey is a significant problem and micronutrient deficit is present with a high frequency in mothers. Considering that approximately 6% of our mothers are in the adolescence during which growth and development is not completed yet, it is clear that nutritional supplements in mothers will be beneficial in terms of public health. In this context, it is a significant priority that nutrition in mothers is emphasized and plans are produced in terms of both the mother's health and ideal breastmilk content.

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