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# Actual Nutrition of Lactating Women in Rural Conditions During Lactation and Its Analysis

**Shoxsanam Baratova**

PhD Student, Department of Human and Animal Physiology and Biochemistry, Samarkand State University, Samarkand, Uzbekistan

**Abstract** The article is devoted to studying the intake of essential nutrients, minerals, and vitamins through the daily diet of lactating women (41 aged 18-29 and 34 aged 30-39) living in rural areas of Surkhandarya region. According to the obtained results, the supply of nutrients through the daily food of lactating women living in this area differs from the existing norms. In particular, compared to the existing standard, the respondents were provided 65.5-75.05% with protein, 93.5-112.7% with fat, 89.8-118.1% with carbohydrates, 29.8-50.3% with Ca, 112.7-131.6% with Mg, 111.8-137.6% with Fe, 63.7-90.7%, 70.6-87.7% with Zn, 21.2-37.0% with J, 62.5-79.9% with vitamins C, 112.5-162.5% with vitamin A, 94-112.7% with vitamin E, 21.3-38.7% with vitamin D, 113.3-186.7% with vitamin $B_1$ %, 92-113.3 with vitamin $B_2$ %, 93.5-107.5% with vitamin $B_6$, 83.5-107.6% with vitamin PP, and 61.5-84.6% with vitamin $B_{12}$. The identified situation indicates that there are imbalances in the nutrition and nutrient supply of lactating women living in rural areas of Surkhandarya region, one of the southern regions of our republic, and that research in this area should be conducted on a large scale in different regions of our republic.

**Keywords** Lactation period, Lactating women, Daily diet, Macronutrients, Minerals, Vitamins

## 1. Introduction

The nutritional regimen of nursing mothers during lactation, including the quantity, quality, and nutritional value of foods consumed, directly affects both the mother's own physiological state and the biosynthesis and biochemical composition of her breast milk. At the same time, these factors also have a decisive impact on the health and development of the child. Breast milk is the only physiologically complete source of all the nutrients necessary for the growth and development of the child in optimal proportions. The qualitative and quantitative adequacy of nutrients in breast milk is a key factor in ensuring the normal growth of the child, the normal maturation of morphological and functional systems, and the correct course of physiological development processes [1].

The nutrient requirements of lactating women depend on a number of individual and physiological factors, including the volume of milk produced during lactation, the mother's age, reproductive status (e.g., the interval between births), and the body's metabolic activity [2].

The process of lactogenesis (breast milk production) requires significant energy expenditure for the female body, i.e. an additional 500 kcal of energy consumption per day. Therefore, the daily diet of nursing mothers should be higher in energy value than the usual diet. According to scientific recommendations, daily energy consumption during lactation should not be less than 2500-3000 kcal, and it should also be enriched with nutrients [3,4].

Macronutrients (proteins, fats, carbohydrates) are the main source of energy necessary to meet the energy needs of the body. In addition, they provide the plastic (construction) material necessary for the synthesis, regeneration, growth and development of cells and tissues. Although micronutrients (vitamins, minerals) are not a direct source of energy, they play a catalytic (activating) role in all stages of metabolism, including the processes of energy acquisition and use. Therefore, without micronutrients, the normal transition of metabolic processes in the body is impossible [5].

Insufficient protein intake by a lactating woman can negatively affect the composition of milk during lactation, in particular the concentration of casein protein. Casein protein is not only the main source of amino acids necessary for growth and development in children, but also plays a crucial role in the absorption and metabolism of calcium and phosphorus in the intestinal tract.

The lactation period causes metabolic, morphological and hormonal adaptive changes in the body of a lactating woman, as this process is aimed at ensuring lactogenesis (milk synthesis) and galactopoiesis (milk secretion) in the mammary glands. Mineral substances necessary to maintain milk production at a physiological level, in particular

* Corresponding author:
shoxsanambaratova11@gmail.com (Shoxsanam Baratova)
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calcium, are mobilized mainly from mineral depots in bone tissue. Due to this mechanism, the lactation period is associated with a loss of bone mass (osteopenia) and an increased risk of osteoporosis, which is the main pathophysiological cause of bone fragility in many nursing mothers [6].

During lactation, insufficient coverage of macronutrients (proteins, fats, carbohydrates) along with micronutrients (vitamins and minerals) in the daily diet can lead to a number of negative consequences in the mother's body, including the risk of developing pathological conditions such as chronic fatigue, weakened immune function, alopecia (hair loss), and decreased bone mineral density (osteopenia) [7,8].

In our republic, scientific data on the nutritional status and eating habits of lactating women have not been collected in sufficient quantities. Therefore, it is an urgent scientific and practical task to conduct a comprehensive study of the practical diet of lactating women living in different biogeographical regions of our country, the level of consumption of nutrients and their state of micro and macronutrient supply, and on the basis of this, to develop individualized dietary recommendations taking into account regional characteristics.

Taking the above into account, during our observations, we aimed to study and assess the provision of macronutrients and micronutrients to lactating women in the villages of Angor district, Surkhandarya region, one of the southern regions of the Republic of Uzbekistan.

## 2. Materials and Methods

Observations were conducted on 41 18-29 and 34 30-39-year-old lactating women living in Angor district of Surkhandarya region during the first 3, 6, and 9 months of the lactation period after childbirth. In participantes, the delivery was on time and healthy children were born. The average educational level of the respondents was secondary vocational college. Most of them are currently housewives.

The amount of basic nutrients, minerals, and vitamins in the daily diet of lactating mothers was checked. Their actual diet was studied using a traditional questionnaire-survey method. The chemical composition of food products was calculated using special tables (SanQ va M №0016-21). The data from the questionnaires were mathematically calculated and statistically processed using the Windows Microsoft Excel program. The results were compared with relevant standards [9].

## 3. Results and Discussion

This study analyzed the daily dietary patterns of nursing mothers living in the Angor district. The main focus of the study was to determine the amount of macronutrients and micronutrients in the daily food consumed. The following tables present the results of the main nutrient intake of the women participating in the research groups in this region.

**Table 1.** Chemical composition and energy value of daily food of lactating women during lactation (18-29 years old)

| Nutrients | Norm [9] | Months of lactation | | |
|---|---|---|---|---|
| | | the result is in the 3rd month (n=41) | the result is in the 6th month (n=37) | the result is in the 9th month (n=28) |
| **Total protein (g)** | 101 | 66,1 ±3,5* | 72,3 ±3,8* | 75,8 ±4,2* |
| **Of these, animal protein (g)** | 60 | 37,9 ±4,1* | 45,7 ±1,8* | 42,8±1,1* |
| **Total fat (g)** | 82 | 78,2 ±3,2 | 83,8 ±3,5 | 86,2 ±3,6 |
| **Of which vegetable oil (g)** | 25 | 28,5 ±2,3 | 48,3 ±3,2* | 42,7±2,7* |
| **Carbohydrate (g)** | 329 | 295,5 ±12,1*** | 341,4 ±11,7 | 361,8 ±15,7** |
| **Total energy (kcal)** | 2500 | 2149,7 ±84,3* | 2408,4 ±81,1 | 2525,9 ±102,8 |

*P<0,001; **P<0,01; ***P<0,05 *when compared to the norm.*

**Table 2.** Chemical composition and energy value of daily food of lactating women during lactation (30-39 years old)

| Nutrients | Norm [9] | Months of lactation | | |
|---|---|---|---|---|
| | | the result is in the 3rd month (n=34) | the result is in the 6th month (n=31) | the result is in the 9th month (n=28) |
| **Total protein (g)** | 99 | 68,9±3,7* | 70,3±1,9* | 69,4±3,1* |
| **Of these, animal protein (g)** | 59 | 35,6±1,2* | 41,2±0,9* | 31,5±1,6* |
| **Total fat (g)** | 78 | 79,5±2,9 | 87,9±3,75*** | 72,9±4,5 |
| **Of these, vegetable oil (g)** | 24 | 45,3±1,8* | 39,2±1,3* | 43,2±1,1* |
| **Carbohydrate (g)** | 314 | 339,4±31,8 | 370,8±17,9** | 352,4±26,8 |
| **Total energy (kcal)** | 2500 | 2308,7±213,5 | 2555,7±132,7 | 2343,3±97,9 |

*P<0,001; **P<0,01; ***P<0,05 *when compared to the norm.*

As can be seen from the tables above, the total protein intake of lactating women living in rural areas of Angor district in the first 3, 6 and 9 months of the postpartum lactation period is 34.5%, 28.4% and 24.5% lower than the norm for respondents in the 18-29 age group, and 31.8%, 29.0% and 29.9% lower for respondents in the 30-39 age group, respectively. Also, their intake of animal protein is 36.8%, 23.8%, and 28.7% lower than the current standards for 18-29 year olds, and 40.7%, 30.2%, and 46.6% lower for 30-39 year olds, respectively.

The total fat content of the respondents' daily diet was close to the norm in both age groups at different periods of lactation, and compared to the norm, it was 95.4%, 102.2%, and 105.1% for age group 1, and 96.9%, 112.7%, and 93.7% for age group 2. However, the amount of vegetable oil in the total fat content is significantly higher than the current standard level, and in different months of the lactation period it is 14%, 93.25% and 70.8% (for 18-29 year olds), 81.2%, 63.3% and 80.0% (for 30-39 year olds) more than the standard (25 g).

Daily carbohydrate intake of participants in the age group of 18-29 years was below the norm in the first 3 months of the lactation period, on average 89.8% compared to the norm, 110% in the 9th month, and close to the norm in the 6th month. It was found that the carbohydrate intake of lactating women aged 30-39 was close to the norm in the 3rd month, but was 18.1% and 12.2% higher than the norm in the 6th and 9th months.

The energy supply of the participants through the consumption of food also shows different results in different periods of lactation (Tables 1 and 2).

As shown in Table 3 below, the amount of calcium in the daily ration of 18-29 and 30-39-year-old lactating women living in rural areas of Angor District in different months of the lactation period was 29.8-50.3% (the lowest and highest results) compared to the lower limit of the existing norm.

The supply of respondents with P and Mg is more than the norm in both age groups, and it was found that phosphorus is 12.7-31.6% more than the existing norms, and magnesium is 11.8-37.6% more than the existing norms.

The participants in both age groups had a deficit in the supply of Fe, Zn and J through their daily food, and compared to the norm, it was found that Fe was 9.3-36.3%, Zn 12.3-29.4% and J 63-78.8% less than the norm.

As shown in Table 4, the daily intake of vitamin C among lactating women living in rural areas of Angor district was below the norm in both age groups, and compared to the norm, it amounted to 62.5-79.9% (the lowest and highest results were given). In contrast, the amount of vitamin A in the daily diet of lactating women was found to be high in all participants, ranging from 12.5-62.5% above the norm (0.8 mg).

**Table 3.** The amount of minerals in the daily dietary intake of breastfeeding women

| Minerals | Norm [9] | the result is in the 3rd month | | the result is in the 6th month | | the result is in the 9th month | |
|---|---|---|---|---|---|---|---|
| | | 18-29 years old (n=41) | 30-39 years old (n=37) | 18-29 years old (n=35) | 30-39 years old (n=34) | 18-29 years old (n=31) | 30-39 years old (n=28) |
| **Ca (mg)** | 1500-2000 | 447,3±35,0* | 615,9±49,5* | 556,8±36,7* | 754,3±54,7* | 606,4±42,4* | 595,4±62,4* |
| **P (mg)** | 1000 | 1126,5±51,4*** | 1314,5±83,4* | 1234,0±58,9* | 1316,2±61,6* | 1208,2±68,5** | 1135,7±78,4 |
| **Mg (mg)** | 300 | 335,3±15,7*** | 363,7±19,4** | 395,6±20,1* | 364,7±38,35 | 373,4±20,5* | 412,9±29,4 |
| **Fe (mg)** | 27 | 17,2 ±0,9* | 24,5±1,2*** | 19,3 ±0,9* | 23,2±0,7* | 21,1 ±1,1* | 18,9±0,3* |
| **Zn (mcg)** | 10000 | 7062,2 ±282,9* | 8125,9±674,8*** | 7821,8 ±327,6* | 8768,4±475,8*** | 8156,8 ±342,3* | 7815,7±521,6* |
| **J (mg)** | 220 | 46,6 ±3,7* | 68,4±5,3* | 60,0 ±4,2* | 81,4±7,2* | 62,8 ±4,4* | 72,9±4,8 |

*P<0,001; **P<0,01; ***P<0,05 *when compared to the norm.*

**Table 4.** The amount of vitamins in the daily dietary intake of breastfeeding women

| Vitamins | Norm [9] | the result is in the 3rd month | | the result is in the 6th month | | the result is in the 9th month | |
|---|---|---|---|---|---|---|---|
| | | 18-29 years old (n=41) | 30-39 years old (n=37) | 18-29 years old (n=35) | 30-39 years old (n=34) | 18-29 years old (n=31) | 30-39 years old (n=28) |
| **C (mg)** | 80 | 50,0±2,9* | 54,2±5,4* | 57,4±3,1* | 63,9±1,75* | 61,1 ±3,3* | 53,2±2,9* |
| **A (mg)** | 0,8 | 1,3 ±0,2** | 1,3±0,05* | 1,0 ±0,2 | 1,2±0,09** | 1,1 ±0,2 | 0,9±0,08 |
| **E (mg)** | 15 | 14,8 ±1,3 | 16,2±1,7 | 15,2 ±1,3 | 16,3±0,8 | 16,9 ±1,3 | 14,1±0,6 |
| **D (mcg)** | 7,5 | 1,6 ±0,1* | 2,7±0,03* | 1,7 ±0,1* | 2,9±0,08* | 2,0 ±0,14* | 2,56±0,05* |
| **$B_1$ (mg)** | 1,5 | 2,8 ±0,3* | 2,4±0,1* | 2,6 ±0,3* | 1,8±0,07* | 2,1 ±0,3 | 1,7±0,09** |
| **$B_2$ (mg)** | 1,5 | 1,38 ±0,08 | 1,7±0,03* | 1,4 ±0,1 | 1,57±0,09 | 1,5 ±0,1 | 1,42±0,04** |
| **$B_6$ (mg)** | 2 | 1,9 ±0,08 | 2,08±0,09* | 2,0 ±0,1 | 2,15±0,04* | 2,0 ±0,1 | 1,87±0,07* |
| **PP (mg)** | 17 | 14,2±0,7* | 18,3±0,5** | 15,8 ±0,9 | 15,4±1,1 | 16,4 ±0,6 | 16,2±1,2 |
| **$B_{12}$ (mcg)** | 2,6 | 1,6 ±0,1* | 2,2±0,07* | 1,7 ±0,09* | 2,15±0,05* | 2,0 ±0,1* | 1,9±0,09* |

*P<0,001; **P<0,05 when compared to the norm.

The respondents' vitamin E intake was close to the norm, with the lowest level of vitamin E intake in the 9th month of lactation (94%) in the 30-39 year olds and the highest level in the 18-29 year olds (112.7%).

The vitamin D intake of the subjects was below the norm, and compared to the norm (7 mcg), the lowest result was 1.3±0.2 mcg in the first 3 months of the lactation period in the 18-29 years old group, and the highest result was 2.9±0.08 mcg in the 6th month of the lactation period in the 30-39 years old group. In contrast, vitamin $B_1$ in the daily diet of lactating women living in this region was higher than the norm in all age groups during different months of the lactation period, with the lowest indicator compared to the norm being 113% (in the 30-39 age group in the 9th month of the lactation period) and the highest result being 186.7% (in the 18-29 age group in the 3rd month of the lactation period). Also, the daily intake of vitamins $B_2$ and $B_6$ by respondents is close to the norm, in particular, the lowest result compared to the norm is 92.0% (in the 18-29 age group in the 3rd month of lactation), and the highest result is 113.3% (in the 3rd month of lactation in the 30-39 age group).

The lowest rate of vitamin PP intake among lactating women compared to the norm was 83.5% in the 3rd month of lactation among 18-29 year olds, and the highest rate was 107.6% in the 3rd month of lactation among 30-39 year olds. However, the participants' vitamin $B_{12}$ intake was below the norm in both age groups, with the lowest result compared to the norm being 61.5% (3rd month of lactation in 18-29 year olds) and the highest being 84.6% (3rd month of lactation in 30-39 year olds).

The results obtained during our observations show that there are imbalances in the nutrition and nutrient supply of lactating women living in rural areas of Angor district. Improper and unbalanced nutrition of mothers during the lactation period affects the general health of the mother and the quality of breast milk. According to scientific studies conducted in various countries around the world, there are links between the quality of a mother's diet and the substances contained in breast milk. In particular, when Samira Karbasi et al. examined the nutritional quality of 350 lactating women and the antioxidant-prooxidant balance in their breast milk, they found that the breast milk of mothers who followed a healthy eating pattern had a higher oxidant-antioxidant status than the breast milk of mothers who had an unhealthy diet [10]. In addition, a study by Leila Azadbakht et al. on the relationship between the quality of the diet of breastfeeding women who exclusively breastfeed their children during lactation and the growth of their children found that the growth and development of children of mothers who followed a high-quality healthy diet index (which is not only associated with energy density, but also with a higher consumption of fruits and vegetables, vitamins, and minerals) was more normal [11].

A mother's healthy diet, avoidance of various stressful situations and smoking, and more walks in the fresh air are key factors in ensuring a normal lactation period and good health for both mother and child.

# 4. Conclusions

In conclusion, we can say that there is an imbalance in the supply of macronutrients and micronutrients among lactating women living in the villages of Angor district, Surkhandarya region, one of the southern regions of the Republic of Uzbekistan.

In particular, it was found that the total protein and animal protein content of the total protein content of all respondents in their daily diet was below the norm. The total fat intake of lactating women was close to the norm, but the amount of vegetable fat in the total fat content was higher than the norm.

The norm of providing breastfeeding women with certain minerals is violated. The participants' daily intake of Ca, Fe, Zn and J is less than the norm, and the intake of P and Mg is more than the norm.

It was found that the daily diet of respondents contained less than the norm of vitamins E, D, and $B_{12}$, more than the norm of vitamins A and $B_1$, and close to the norm of vitamins E, $B_2$, $B_6$, and PP (vitamin PP was 16.5% less than the norm in the 3rd month of lactation in 18-29 year olds).

According to the obtained results, it was found that the most norm limits were violated in the 3rd month of the lactation period by lactating mothers aged 18-29.

Studying the physiological supply of basic and additional nutrients to lactating women during lactation is important for maintaining and strengthening the health of the mother and child. In this regard, the formation of their rational nutrition and healthy lifestyle, and the promotion of understanding of the topic among them are important practical measures.

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