

Pregnancy and puerperium during lactation

Burçin Karamustafaoğlu Balcı, Gökhan Göynümer

Gynecology and Obstetrics Clinic, Göztepe Training and Research Hospital, İstanbul Medeniyet University, İstanbul, Turkey

Abstract

As the lactation period extends, the chance that they still breastfeed when they get pregnant increases. The studies show that there is no increase in the risk of miscarriage, preterm labor and intrauterine growth retardation. On the other hand, when pregnant woman maintains lactation, it seems that birth weight to be born decreases. No guidelines has been found in the literature showing the daily calorie, protein, vitamin and mineral needs of lactating pregnant women; however, it should be taken into consideration that energy, protein, vitamin, mineral and water needs of pregnant women who also lactate increase. Although the data in the literature indicates that lactating during pregnancy is safe, available studies cannot prove that lactation during pregnancy is either harmful or useful for mother/fetus/baby.

Keywords: Lactation, pregnancy, maternal health, miscarriage risk, early labor.

Özet: Laktasyon döneminde gebelik ve lohusalık

Annelerin bebeklerini emzirdikleri süre uzadıkça, tekrar gebe kaldıklarında halen emziriyor olma ihtimalleri artmaktadır. Çalışmalar laktasyon döneminde oluşan gebeliklerde düşük, preterm doğum ve intrauterin gelişme kısıtlanması riskinin artmadığını göstermektedir. Bununla beraber, gebe anne laktasyona devam ettiğinde doğacak bebeğin doğum ağırlığı azalıyor gibi durmaktadır. Literatürde emziren gebelerin günlük kalori, protein, vitamin ve mineral ihtiyacını gösteren bir kılavuza rastlanmamıştır, fakat gebe olup da süt veren annelerin enerji, protein, vitamin, mineral ve su ihtiyaçlarının arttığını göz önüne almak gerekir. Bu konudaki veriler gebelikte emzirmenin güvenli olduğu yönünde olsa da, mevcut çalışmalar gebelik döneminde laktasyonun ne anneye/fetüse/bebeğe zararlı olduğunu, ne de üçü için de tamamen güvenli olduğunu kanıtlayabilmektedir.

Anahtar sözcükler: Emzirme, gebelik, anne sağlığı, düşük riski, erken doğum.

Introduction

This study has been prepared for related healthcare professionals (gynecologists and obstetricians, pediatricians, midwives, nurses and lactation consultants) in order to review available information about conception during lactation, maintaining lactation during pregnancy and tandem nursing after delivery.

It is known that breast milk is a unique nutrition for babies. Breast milk contains almost all nutrition required by babies in their first months. It is clean and does not require any preparation, it is at the proper temperature, it contains antibodies and therefore protects baby. Since 2001, World Health Organization has been recom-

mending exclusive breastfeeding up to 6 months of age, with continued breastfeeding along with appropriate complementary foods up to two years of age or beyond.^[1] Most of the mothers want to breastfeed for a long time for the purposes of feeding their babies, protecting them against infections and having the emotional satisfaction of breastfeeding. Turkish Population and Health Survey 2013 showed that 33.9% of 20-23-month-old babies were breastfed and the mean lactation period for all children born within three years before 2013 was 16.7 months.^[2] According to the data of the same survey, 18% of the deliveries in Turkey occurred less than 24 months after the previous delivery.^[2] According to these data, we should observe a consider-

Correspondence: Burçin Karamustafaoğlu Balcı, MD. İstanbul Medeniyet Üniversitesi, Göztepe Eğitim ve Araştırma Hastanesi Kadın Hastalıkları ve Doğum Kliniği, İstanbul, Turkey. e-mail: burcinkaramustafaoğlu@yahoo.com

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able amount of new pregnant women in the clinics who have a child below 2-year-old they are breastfeeding. Pregnancy, delivery and puerperium are the periods that women are in close contact with healthcare professionals. Therefore, efficient presentation of healthcare services during these periods is significant.

According to various studies, women who have training about lactation before delivery are more tended to breastfeed their babies during the first 6 months and to continue lactating afterwards compared to other mothers.^[3,4] It is very critical to inform mother for the continuation or discontinuation of lactation when a breastfeeding woman gets pregnant. We need to have up-to-date information and clear opinions on this matter. Does lactation affect fertility negatively? Should the lactation be discontinued after conception? Does lactation during pregnancy increase abortion or preterm labor risk? What will happen after delivery? Is it possible to breastfeed two siblings at the same time, one being newborn and other being nursing infant? What should we recommend mothers and their families?

Lactation and Subfertility

Prolactin hormone secreted in the anterior pituitary enables milk production. Prolactin hormone increases gradually beginning from the 5 weeks of gestation up to delivery and reaches its maximum level at the end of pregnancy which is 200–400 ng/ml from 10–25 ng/ml.^[5] Prolactin level decreases approximately to 50% of term level in the first postpartum period.^[5] However, during each breastfeeding, hypothalamus is stimulated through the nerves on nipple. The secretion of prolactin hormone increases 10–20 times within an hour and milk is produced.^[5] While prolactin hormone enables milk production, it also suppresses follicle stimulating hormone (FSH) and luteinising hormone (LH), keeps estrogen levels low and ovulation is suppressed by preventing follicle development. This hypothesis explains the prevention of fertility by lactation.

Women who feed their babies only with lactation and do not menstruate are not expected to get pregnant within first 6 months during postpartum period. This can be considered as the contraception method during postpartum period. This method called as lactational amenorrhea is a method that can be used when certain conditions are met until an effective contraception

method is chosen. Under these conditions, menstruation should not have started yet and baby is only fed by breast milk.^[6] If both conditions are available, lactational amenorrhea becomes efficient about 98–99.5%.^[6]

The efficacy of lactational amenorrhea method is directly associated with the lactation duration and frequency. The studies have showed that feeding the baby with only breast milk (full lactation) extends the duration of lactational amenorrhea compared to partial lactation and prevents the return of postpartum fertility.^[7–9] Feeding baby with only breast milk means that there is only 4-hour interval between two breastfeeding activities during the day at the most and 6-hour interval during the night at the most, baby does not receive any liquid or solid nutritional supplements^[10] and lactation duration is at least 4–5 minutes.^[5] Lactation frequency decreases with the nutritional supplements after first 6 months as well as the milk amount produced, and therefore the body becomes ready for a new pregnancy. Lactational amenorrhea method is effective in the first sixth months after delivery. Afterwards, the couples should prefer another contraception method.

Lactation and Fertility

Conception during lactation period and discontinuing lactation is a common case in the world.^[11,12] Conception during lactation period has been common for ages in societies with low socioeconomical levels and in developing countries where lactation takes long and effective contraception methods are restricted.^[13] For instance, 25% of the women on gestational follow-up in Egypt got pregnant during lactation period.^[14] We know that half of the pregnancies in Guatemala^[11] occurred during lactation periods, and that 70% of the pregnant women in some poor regions of India^[15] were already breastfeeding. On the other hand, no data has been found in the literature about the rate of pregnancies during lactation in the developed countries.^[13]

Lactation During Pregnancy and Tandem Nursing: Do-Or-Die?

When lactating mother gets pregnant and decides to continue lactating during the pregnancy, following questions cross clinician's mind: the nutritional needs of mother will change. What should I recommend about nutrition to a lactating woman who gets preg-

nant? Do the development and growth of fetus and nursing slow down? Does the amount/quality/taste of milk change? Will abortion or preterm labor be triggered?

Nutritional Needs

Recommended dietary allowance increases during pregnancy and lactation periods. Depending on the age of mother who lactates or gestational age, this increase is roughly 34.6% for energy and 54% for protein.^[16] Lactation requires more nutrition than pregnancy; during lactation, carbohydrate need increases 61.5% and protein need increases 54.3%.^[16] Vitamin and trace element needs does not increase for some individuals (biotin, potassium and chloride needs) while it may double for some individuals (i.e. vitamins A and C).^[17-19] After delivery, women should complete the deficiencies of their bodies until next pregnancy and delivery. As the needs for energy, vitamin, mineral and protein increase during lactation, the duration between the end of lactation and next pregnancy is more significant than the "duration between pregnancies". The minimum period without pregnancy and lactation is still controversial.

Although there are no guidelines for daily dietary need of lactating mother for each trimester, it is clear that lactating mother should be nourished better than other pregnant women and increase her protein/energy/vitamin/mineral/water supplement. It can be easily predicted that the nourishment needs of lactating pregnant woman will reach the maximum level at third trimester in which fetus has the fastest growth rate. Also, when lactation is continued more than one year, the energy and fat content of milk is statistically and significantly higher than the milk women who have been lactating for a short time.^[20] The study carried out in Philippines^[21] compared lactating and non-lactating women and found no difference in terms of total weight gain during pregnancy but observed that lactating pregnant women gained weight faster significantly at third trimester. In this study, mean lactation period during pregnancy was 11.9 ± 0.35 weeks in women who got pregnant during lactation. On the other hand, weight gain of those continuing lactation on the third trimester was affected negatively.^[21] According to this study, it is seen that the pregnant women who lactate only in the beginning of the pregnancy make up the difference by rapid weight gaining through the end of pregnancy;

however, those who lactate throughout the whole pregnancy seem to gain less weight eventually. The study comparing 45 women lactating during pregnancy and 120 women not lactating during pregnancy found that lactating pregnant women gained less weight.^[22]

Institute of Medicine (USA) recommends lactating women to nourish with a diet including various vegetables, fruits and grains rich in calcium and protein.^[23] Although it is easy to meet calorie need as foods rich in fat and sugar are consumed much in developed countries, vitamin and mineral deficiencies should be paid attention in both developed and developing countries. During the pregnancy, women should take 150 kcal/day at the first trimester, and 300 kcal/day at the second and third trimesters in addition to normal nourishment.^[24] During the period when baby is fed only with breast milk, mothers consume 628 kcal/day additionally due to milk production.^[25] It is not recommended to receive such calories by additional foods, a little lower amount of calories can be received since the body of mother stores fat for postpartum period during a normal pregnancy.^[25] In another study comparing lactating and non-lactating women, it was found that women who lactate consume an additional 580 kcal daily (2460 kcal vs. 1880 kcal).^[26]

Increasing blood production in order to tolerate growing fetus and increasing blood volume of mother during pregnancy and the loss during delivery also increases the need for iron. While required iron support is daily 30–60 mg elementary iron for women not lactating during pregnancy,^[27] it is 9 mg/day after 19-year-old during lactation where mother is not pregnant, and 10 mg/day during 14–18-year-old.^[18] When the support of iron and non-availability of iron support during pregnancy were compared, it was found that preterm labor, low birth weight, maternal anemia and iron deficiency were higher in those who were not provided iron support.^[27] The significance of iron for both fetuses^[28] and mental development of babies^[29] and also the role in gestational diseases such as preeclampsia and intrauterine growth retardation^[30] are known. The most common vitamin/mineral deficiency in developed and developing countries is iron deficiency.^[31] Ayrim et al. found a significant decrease in hemoglobin values of women lactating during pregnancy compared to those not lactating during pregnancy.^[22] Consequently, providing iron support to lactating pregnant women is significant for fetus, mother and nursing.

Since folic acid elimination through urine increases during pregnancy and there are high amount of cells with rapid division in the body of pregnant woman, the need for folic acid of pregnant women increases.^[27] Neural tube is closed on day 28 and even pregnancy may not be identified yet in such a short period of time. After pregnancy is identified, folic acid support will not be beneficial for neural tube development but for meeting the needs of mother.^[27] World Health Organization recommends to take 400 µg folic acid daily during pregnancy.^[27] During lactation, it is recommended to take 500 µg folic acid daily.^[17]

Increasing calcium need during pregnancy is met by the increase of calcium absorption from gastrointestinal system.^[32] Calcium release from bones also helps to meet the increasing need during pregnancy.^[32] Therefore, additional calcium support is not required during pregnancy.^[33] Pregnant women are recommended to take 1200 mg/day calcium through foods.^[34] In societies with insufficient consumption of foods rich in calcium, it is recommended to provide 1.5–2 g elementary calcium support daily from 20 weeks of gestation up to delivery.^[35] It is seen that the greatest source for calcium transfer to milk during lactation period is skeletal system, renal reabsorption also provides calcium in small amounts.^[32] It is understood that the calcium taken by food is the greatest source during pregnancy while the calcium stored in the body is the greatest source during lactation.^[32] It is clear that the calcium need of woman who undertook a pregnancy and started to lactate, then gets pregnant and continues to lactate is high; however, there is no detailed information on the exact amount of daily calcium support for a lactating pregnant woman.

Vitamin A has a significant role for cell division, development of fetal organs and skeletal system, vision and immune system. While vitamin A supplement is not recommended in the routine pregnancy follow-up, vitamin A supplement during pregnancy and postpartum period in countries, where vitamin A deficiency is a significant public health issue, is recommended to protect both fetus during pregnancy and the baby during lactation against vitamin A deficiency.^[36] The recommendation is to take 800 µg retinol daily together with foods during pregnancy; however, since vitamin A is available in foods which are not easily accessible such as vegetable, fruit, meat and dairy products in low-income countries, pharmacological support is required in such countries.^[36]

The supplement for vitamin A is maximum 10,000 IU daily or 25,000 IU weekly for at least 12 weeks during pregnancy.^[36] The babies born with low amount of vitamin A reserve and breast milk should include sufficient amount of vitamin A to nourish babies. Yet, vitamin A supplement is not recommended for puerperant women; postpartum vitamin A supplement does not affect maternal and fetal mortality and morbidity.^[37] In developed and developing countries, further studies are required to determine whether women who are lactating during pregnancy or not, and the amount if required.

During the pregnancy, 3 lt/day water is required while 3.8 lt/day water is required during the lactation period.^[19] Although there is no clear data for the need of daily water amount for lactating pregnant women, they need to drink more water than regular amount in order to increase milk production and to meet the need increased during pregnancy.

Growth and Development of Fetus When Breastfed

No study has been found in the literature focused on determining if lactation during pregnancy increases to deliver baby small for gestational age or the rate of in utero growth retardation. On the other hand, the studies in the literature have reported different results. A study in the past found that the children of lactating mother were 57 g lighter than the children of non-lactating mother, which is statistically not a significant difference.^[11,12] A study carried out in Turkey in 2013 included 61 women who got pregnant again within 2 years after the delivery; in this study, lactating and non-lactating pregnant women were compared and it was found that the birth weight was statistically and significantly lower in the lactating pregnant women than the other group ($p=0.006$).^[38] In another study, overlapping of lactation and pregnancy was not found to be associated with delivering baby small for gestational age.^[39]

Growth and Development of Baby When Lactating Mother Gets Pregnant

When lactating women get pregnant, it is hard to understand if the development of nursling is delayed. Besides, even such a case is identified, no causation can be interpreted between lactation or quality/content of milk and development. With the new pregnancy, the attention and time spared for the baby will decrease. There are a few

studies in the literature investigating the effects of lactation during pregnancy on pediatric health. Devocioğlu et al. presented two cases in their studies in which one case found out in the postpartum third month that she was pregnant while the other case found out in the postpartum 15th month, and they continued lactation both during pregnancy and after the delivery.^[40] Both babies of both women were regularly followed up in the same clinic, and since developments of four babies in the first 6-month follow-ups were normal, it was considered normal to feed them with only breast milk. The first child of first mother was 25-month-old and the mother was continuing to lactate when we were preparing the paper. Second mother discontinued to lactate the first child when the child was 26-year-old. Growth and development of both children of both mother had regular progress according to their ages.^[40] Bohler et al. found that the growth rates of children which were discontinued to breastfeed during pregnancy were lower than those never breastfed or continued to be breastfed during pregnancy.^[41] This matter remains unclear since the development of older child does not only depend on breastfeeding.

Does the Amount/Quality/Taste of Milk Change?

As the lactation frequency decreases, the sodium and protein concentrations of the milk increase while glucose, lactose and potassium concentrations decrease.^[42] These changes occur depending on the decrease of lactation rate.^[42] In the beginning of the pregnancy, independent from the lactation rate, same changes occur (sodium and protein concentrations increase, and glucose, lactose and potassium concentrations decrease).^[42] It is seen that milk production decreases in the beginning of the pregnancy by resisting to the stimulus created by lactation.^[42] These changes in the breast milk during pregnancy would change the taste of milk. These changes may create problems for nursing, the baby may decrease to suck milk, does not want breast milk or continue to suck breast milk as before. Besides, it is known that the taste of breast milk change and the baby tastes different milk every time.^[43,44]

Relationship Between Lactation and Abortion

The opinion that lactation may cause abortion is based on the idea that two hormones are considered to be dangerous: prolactin and oxytocin. Hirahara et al. found that

the pregnancy rates of patients with hyperprolactinemia are higher when treated with bromocriptine than those not treated with bromocriptine.^[45] Bromocriptine inhibits prolactin production and decreases the prolactin level. When prolactin reaches normal levels, ovulation and then fertilization may occur. Hirahara et al. also found that prolactin levels were higher in the early periods of pregnancy in patients who had miscarriage.^[45] It is understood through these two data that prolactin increase occurring during lactation may increase the risk of spontaneous pregnancy loss during the first trimester. The second problem is the increase of oxytocin release from hypothalamus as the nursing sucks nipple. Oxytocin enables the release of milk by the contraction of myoepithelial cells of breast and also triggers uterine contractions. While this effect is beneficial for hemodynamics by decreasing uterine hemorrhage during postpartum, is it harmful by causing abortion when conception occurs? Oxytocin release by lactation seems that it does not cause any risk in pregnant women for 3 reasons. First of all, the oxytocin receptors in myometrium and sensitivity of uterus to oxytocin increases in the late periods of pregnancy and especially during delivery, and the amount of oxytocin receptors decreases rapidly after delivery.^[46] There is resistance before and after delivery relative to oxytocin.^[46] Secondly, oxytocin release decreases over time in response to nipple stimulation;^[47] oxytocin release occurring with lactation after months following delivery is not as strong as those during the first postpartum days. And thirdly, it was found that the oxytocin increase in pregnant women was not as high as in other groups when the increase rate of oxytocin after nipple stimulation was investigated in pregnant women, postpartum lactating women and women with normal cycles.^[48] Although prolactin and oxytocin levels higher in lactating women than normal pregnant women seem to increase abortion risk in the first trimester, the three studies we have^[22,49,50] found no relationship between lactation and early gestational losses. Ishii^[49] compared 110 lactating pregnant women with 774 non-lactating pregnant women and found similar abortion rates between two groups. Vitzthum et al.^[50] investigated the abortion cases before 7 weeks of gestation as early gestational losses and did not find any increase in lactation and rates of abortions. Ayrim et al. found no increase in the risk of threatened abortion in lactating pregnant women.^[22] Sengul et al.^[38] compared the pregnancies of 39 lactating and 22 non-lactating women and reported 3 missed

abortion cases in the group of lactating women while the other group had no abortion. This difference is not statistically significant; however, the low population of the groups should also be considered.^[38]

The Relationship between Lactation and Preterm Labor

Oxytocin is one of the pharmacological methods used for labor induction. It is thought that not only oxytocin by IV but also oxytocin secreted with nipple stimulation causes labor induction. On the other hand, no case was found in the literature which had early labor as a result of oxytocin secretion due to lactation. The studies in the literature compared the gestational outcomes of lactating and non-lactating women and found no relationship in terms of preterm labor.^[22,38]

Personal Decision

The data found in the literature can neither prove that lactation during pregnancy is harmful nor completely safe for mother/fetus/baby. Therefore, pregnant women should be warned that it may not be safe although there is no strong data to recommend discontinuing the lactation after conception. The age of nursing is also important when informing lactating pregnant women; the need of a 7-month-old baby for breast milk is not same as a 24-month-old baby. Whether the mother has additional diseases or not, dietary habits of mother, access to diet rich in calcium and protein together with mineral and vitamin supplement, obstetric anamnesis of pregnant woman (presence of previous abortion/preterm labor history), progress of pregnancy and whether fetus has sufficient growth or not in ultrasound follow-up are the issues to consider when making a decision.

The decision to continue or discontinue lactation during pregnancy should be a personal decision to be made by mother according to the information she gets. If it is decided to discontinue lactation, this process may not be always very fast and easy. Also, according to a study, it was found that 39% of pregnant women continued to lactate but did not inform their gynecologists and obstetricians.^[51] Due to these two reasons, lactating pregnant women should be recommended to pay attention their diets and to consume plenty of water, and they should be informed about tandem nursing.

Conflicts of Interest: No conflicts declared.

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